A STUDY OF THE MICROBIOLOGICAL PROFILE IN CHRONIC DACRYOCYSTITIS

DISSERTATION SUBMITTED FOR M.S.DEGREE

EXAMINATION

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CHENNAI, TAMILNADU

CERTIFICATE

This is to certify that this dissertation entitled "**A study of the Microbiological profile in Chronic Dacryocystitis**" submitted by **Dr.A.Sukanya** to the faculty of Ophthalmology The Tamil Nadu Dr. MGR Medical University, Chennai in partial fulfilment of the requirement for the award of M.S Degree in Branch III (Ophthalmology), is a bonafide research work carried out by her under our direct supervision and guidance.

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Certificate of Approval

This is to certify that the Institutional Ethical Committee of Tirunelveli Medical College and Hospital, Tirunelveli-11has unanimously approved the dissertation titled 'Microbiological study in Chronic Dacryocystitis' by Dr.A.Sukanya, M.S., (Ophthal) student, Tirunelveli Medical College, Tirunelveli- 11 in its meeting held on 09.10.2009.

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The Concerned.

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DECLARATION

I solemnly declare that the dissertation **titled " A study of the Microbiological profile in Chronic Dacryocystitis"**is done by me at Tirunelveli Medical College hospital, Tirunelveli under the guidance and supervision of Prof. **Dr.A.Meenakshi Sundaram** M.S.

The dissertation is submitted to The Tamilnadu Dr. M.G.R.Medical University towards the partial fulfilment of requirements for the award of M.S. Degree (Branch III) in Ophthalmology.

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INTRODUCTION

Dacryocystitis is inflammation of the lacrimal sac usually secondary to obstruction of the nasolacrimal duct. The lacrimal drainage apparatus is an effective system for drainage of tears. When there is obstruction in the drainage apparatus, there is stasis of sac contents which forms a reservoir for development of infection. The close association of conjunctival and nasal mucosa with the sac makes it more prone to infection. The most common sources of infection are the nose, paranasal sinuses and pericystic tissues[1].

Dacryocysitis may be either congenital or acquired. Congenital dacryocystitis is usually due to incomplete canalisation of the nasolacrimal duct. Congenital blockage is seen in 3-6% of term infants[2]. Acquired dacryocystitis is commonly seen in middle age with the highest incidence noted in the 5^{th} decade. Females (80%) are more commonly affected than males (20%). The increased incidence in females is due to the narrowness of the nasolacrimal duct. Dacryocysitis can be classified into two types - acute and chronic. Acute dacryocystitis presents with pain, redness and tenderness over sac area. Chronic dacryocystitis presents with persistent epiphora and regurgitation of mucoid or mucopurulent material on pressure over sac area.

AIM OF THE STUDY

1. To analyse the bacterial etiology in cases of chronic dacryocystitis reported at a tertiary level hospital.
2. To assess the association of chronic dacryocystitis with age, sex of patient, duration of symptoms and laterality.
3. To determine their invitro susceptibilities and resistance to antibiotics

REVIEW OF LITERATURE

Anatomy of lacrimal apparatus

Lacrimal gland

The lacrimal gland is a tubuloacinar gland with short branched tubules lying above and anterolateral to the eyeball and secretes tears through a series of ducts into the superior fornix. The lacrimal gland is divided by the superior transverse ligament of Whitnall into

- A large orbital or superior part
- A small palpebral or inferior part in continuity with the superior part.

Ducts of lacrimal gland

About 10-12 ducts pass downwards from the main gland and open into the lateral part of superior fornix[3]. Since all the ducts pass through the palpebral part of the gland, excision of the palpebral part alone amounts to excision of entire gland as far as secretory function of the gland is concerned.

Blood supply

Main lacrimal gland is supplied by lacrimal artery, a branch of ophthalmic artery. Sometimes a branch of transverse facial artery may also supply the gland. Lacrimal veins draining the gland open into the ophthalmic vein. Lymphatic drainage is into preauricular nodes.

Nerve supply

The sensory nerve supply to lacrimal gland is from the Lacrimal nerve, a branch of ophthalmic division of the fifth cranial nerve. The sympathetic nerve supply comes from the carotid plexus of the cervical sympathetics. The para sympathetic secretomotor fibres arise from the superior salivatory nucleus; pass through the Greater superficial petrosal nerve which joins with the Deep petrosal nerve to form the Nerve of pterygoid canal (vidian nerve). From here para sympathetic fibres after relaying in the Spheno palatine ganglion pass via the Zygomatic nerve on to the Lacrimal nerve to reach the lacrimal gland.

Accessory lacrimal glands

The accessory glands of Krause and Wolfring are located in the superior fornix and above the superior border of tarsus respectively

Tear film composition

- Mucinous or inner layer secreted by goblet cells
- Aqueous or intermediate layer secreted by main and accessory lacrimal glands
- Oily or outer layer secreted by meibomian glands

Lacrimal puncta

Each punctum lacrimale is a small round oval orifice on the summit of an elevation, the papilla lacrimalis, near the medial end of the lid margin at the junction of the ciliated and non ciliated parts. The upper

punctum is slightly medial to the lower, their respective distances from the medial canthus being 6 and 6.5mm respectively[4]. The puncta are surrounded by a ring of dense fibrous tissue which keeps them patent. With each blink the puncta slide in the groove between the plica semilunaris and the eyeball.

Lacrimal canaliculi

The canaliculi are each 8-10 mm long. In 90% individuals they combine to form a common canaliculus that enters the lateral wall of the tear sac. A fold of mucosa, the valve of Rosenmuller, normally prevents tear reflux from the sac back into the canaliculi with operation of the tear pump.

Lacrimal sac

It lies in the lacrimal fossa located in the anterior part of medial orbital wall. The fossa is bounded by the anterior and posterior lacrimal crests. Medial to the sac is the middle meatus of the nose and anterior ethmoidal cells separated by the thin lacrimal bone and the thicker frontal process of maxilla. The angular artery and vein lies 7-8 mm medial to the medial canthal angle.

Nasolacrimal duct

The nasolacrimal duct measures 12 mm in length and opens into the nose through an ostium that is usually partially covered by a mucosal

fold (valve of Hasner). The duct is directed downwards laterally and slightly posterior.

Physiology of tear drainage

Tear drainage is brought about by an active lacrimal pump mechanism described by Rosengren-Doane[5]. It is constituted by fibres of the preseptal portion of the orbicularis which arise from the lacrimal fascia and the posterior lacrimal crest (Horner's muscle). The contraction of the orbicularis muscle provides the motive force for drainage of tears.

Conjunctival flora

The conjunctiva and eyelids harbour many microorganisms which may be either resident flora or transient flora. Resident flora comprises of Staphylococcus epidermidis and Corynebacterium xerosis. The transient flora is composed of both pathogenic and non pathogenic organisms.

Normal conjunctival flora is held in check by the following factors

- Flushing mechanism provided by tears
- Bactericidal action of lysozymes present in tears
- Phagocytosis of epithelial cells
- Mechanical barrier of intact mucous membrane
- Blinking action of lid

The various pathogens found in the conjunctiva are as follows

Gram positive

- Diphtheroids
- Staphylococcus aureus
- Hemolytic and Non hemolytic Streptococci
- Bacillus species

Gram negative

- Hemophilus species
- Moraxella species
- Neisseria species

Enteric species

- Escherichia coli
- Klebsiella pneumonia
- Enterobacterium species

Fungi

- Aspergillus species
- Mucor
- Dematiaceous fungi
- Candida species

Evaluation of the nasolacrimal apparatus

Examination with diffuse illumination using magnification: is done to rule out causes of reflex hypersecretion located in lids, conjunctiva, cornea etc. This should exclude punctal causes of epiphora and any swelling in sac area.

Regurgitation test : a steady pressure is applied over lacrimal sac area. Reflux of mucopurulent discharge indicates chronic dacryocystitis with obstruction at lower end of nasolacrimal duct.

Fluorescein dye disappearance test[6,7] : This is a physiologic test to analyse the lacrimal drainage which is useful in children and infants. The tears are stained with a moistened flourescein strip in each eye, patient is instructed not to wipe the eyes and blink at a normal rate and the tear film is observed after 5 minutes with cobalt blue filter of slit lamp. Persistence of dye and asymmetric clearance of dye from the conjunctival sac indicates a partial obstruction on the side retaining dye

Jones I test[8] **:** Fluorescein in the tears is recovered in the inferior meatus by passing a cotton tipped applicator into the region of opening of NLD after 2 and 5 minutes. Staining of the applicator indicates patency. Non staining indicates anatomic or physiologic block.

Jones II test : When Jones I test is negative, syringing is done in the same eye. Flourescein retrieved from the nose after syringing the

lacrimal sac indicates physiologic block. Absence of dye indicates anatomical block.

Syringing : Topical anesthetic is instilled and the lower punctum is dilated with Nettleship's punctum dilator. Saline is injected through a smooth tipped cannula passed into the lacrimal canaliculus 2 mm downwards and then turned medially to lie in the horizontal portion of the canaliculus. Irrigating solution is injected and results are observed. If saline passes freely into the nose or throat it indicates patent nasolacrimal system. On syringing the block may be either complete, partial or functional.

In complete NLD obstruction the fluid regurgitates through either the same punctum or the upper punctum depending on the level of obstruction.

In partial NLD obstruction there is a combination of saline reflux through upper punctum and the fluid passing into the patients throat.

In functional block the saline passes freely into the nose or throat, as a patent nasolacrimal system is present. However this irrigation is successful under increased hydrostatic pressure so there could still be a lacrimal pump failure.

Probing : Diagnostic probing of the upper system confirms the level of obstruction. A lacrimal probe no.3.0 or 4.0 is used. If obstruction is encountered, the distance is measured by clamping the probe at the

punctum before withdrawal. The probe should not be forced through any area of resistance to avoid making a false passage.

In canalicular block the resistance is felt at or before 8mm. Both canaliculi are tested separately. In common canalicular block the obstruction is at 8-10 mm[9] and the probe meets a soft resistance (*Soft stop*) and on moving the probe against the resistance , the tissues at the medial canthus will be seen to move. In fibrosed small lacrimal sac or in nasolacrimal duct block, the probe meets a bony resistance beyond 10 mm (*hard stop*) and on moving the probe against it, there is no movement of tissues at the medial canthus .

Nasal endoscopy: is helpful in evaluation of nasal septal and turbinate diseases. It is now possible to directly visualise the nasal passages using endoscopic equipments. Presence of inferior turbinate hypertrophy or nasal polyps should be identified.

Mini endoscope known as dacryoscope allows direct visualisation of interior and lining of the lacrimal passages.

Chemiluminescent evaluation : cyalume is injected with a sialography catheter to demonstrate the structure and patency of outflow passages. It eliminates any radiation exposure and may also be used during surgery.

Dacryocystography : is used to delineate the anatomy of lacrimal system, define level of obstruction[10] and identify the presence of any fistula, diverticula, stone or tumour in the sac. To perform it, a radio-opaque material such as lipiodol, dianosil or conray-280 is pushed into the sac using a lacrimal cannula. X rays are taken after 5 and 30 minutes to visualize the entire passage. For better anatomical visualization the modified technique known as 'subtraction macrodacryocystography' with canalicular catheterisation should be preferred.

Scintigraphy[9] : It requires radioactive dye, sodium pertechnate, instilled into the tear film. The lacrimal sac area is scanned with gamma camera to follow the progress of the dye into canaliculi, sac, NLD, and nose.

CT : It is useful in craniofacial injuries, congenital craniofacial deformities or when neoplasia is suspected. It also helps in evaluating concomitant sinus or nasal diseases[11].

Dacryocystitis

Dacryocystitis is the inflammation of the lacrimal sac. The disease has been known from earliest times owing to its grosser manifestations involving abscesses and fistulae on the face but was interpreted variously and the general term, ήγνλοψ (argilops, a fistula) was given to all swellings of inner canthus. In the middle of first century A.D., Vesalius and Fallopius described the lacrimal system with considerable accuracy. Further George E. Stahl of Halle in 1702 described that the pathological manifestations of ήγνλοψ were due to inflammation, not of the tissues generally but of the naso-lacrimal canal, these manifestations taking three forms - acute, chronic and hydropsia or ulceration (i.e., with a fistula).

Duke elder remarked "Dacryocystitis - inflammation of lacrimal sac and duct – is a common and unpleasant disease, partly because of the troublesome and conspicuous symptoms it may cause, partly because it has little tendency to resolve and its adequate treatment presents considerable problems".

It presents in three different forms :

- Congenital dacryocystitis
- Acute dacryocystitis
- Chronic dacryocystitis

Congenital dacryocystitis

Congenital dacryocystitis is seen in 3-6% of otherwise healthy infants. It is due to a failure of canalization of the duct so that its lumen is blocked near the lower ostium by epithelial debris, by a membrane or by a stricture in the bony canal. Of these the commonest cause is an imperforate membrane leading onto epiphora. In 80 to 90% of cases, the residual membrane spontaneously dissolves within 2 to 4 months after birth. Majority of persistent cases will respond to conservative treatment with antibiotics and lacrimal sac massage.

Treatment includes

- Proper counselling
- Crigler's massage – massage of the sac increases the hydrostatic pressure and may rupture the membranous obstruction. In large majority of cases, the cause of failure of conservative management is the improper technique of sac massage. It is therefore imperative to explain the proper way of massaging the sac area. The mother should be instructed to compress the sac by applying pressure with the pulp of the index finger and with firm, gentle pressure slide the finger down for about one inch in the groove between medial inferior orbital rim and nose. Ten strokes should be applied four times a day.
- Topical antibiotics are reserved for cases with superadded bacterial conjunctivitis which is surprisingly uncommon.

- Probing : should be delayed until the age of 12-18 months because spontaneous canalization occurs in 96% of cases[53]. Probing performed within the first 1-2 years of life has a very high success rate. It is carried out under general anaesthesia. The rationale is to manually overcome the obstructive membrane at the Hasner valve. After probing, the lacrimal system is irrigated with saline labelled with fluorescein. If fluorescein can be recovered by aspiration from the pharynx, successful probing is confirmed. Postoperative steroid antibiotic drops are used q.i.d for upto 3 weeks. If no improvement repeat probing is done after 6 weeks. Nasal endoscopic monitoring of probing is recommended to detect anatomical abnormalities. Results are excellent and 90% of children are cured by first probing and a further 6% by the second.
- Lacrimal intubation : if second probing fails then temporary intubation with fine silastic tubes with or without balloon dilatation of the nasolacrimal duct may effect cure. Success rate of silicone intubation as been reported to be from 80 to 90% in congenital nasolacrimal duct obstruction [13,14].
- Dacryocystorhinostomy : done very rarely for persistent watering only after 3 years of age after completion of bone development.

In children all other causes of watering should be ruled out before the diagnosis of congenital dacryocystitis is made. The other causes of watering include outflow abnormality and reflex watering.

Congenital watering[15]

Outflow abnormality	**Reflex watering**
Punctual agenesis	Congenital glaucoma
Congenital dacryocystocele	Epiblepharon
Nasolacrimal duct obstruction	Distichiasis
Congenital lacrimal-cutaneous fistula	

Acute dacryocystitis

Acute dacryocystitis is commonly caused by retention of tears leading on to secondary infection with bacteria. It is manifested by sudden onset pain, erythema and edema over sac area and epiphora.

Tenderness is localised in the medial canthal area.

Common organisms causing acute dacryocystitis are

- *Staphylococcus aureus*
- *Staphylococcus epidermidis*
- *Pseudomonas aeruginosa*
- *Klebsiella and acenetobacter*
- Rarely a fungal etiology has also been incriminated

Complications include

- Lacrimal mucocele
- Lacrimal fistula
- Lacrimal abscess
- Chronic conjunctivitis
- Orbital cellulitis[16]
- Orbital abscess[16,17]

Treatment

This includes institution of appropriate antibiotic therapy systemically and locally coupled with warm compresses over the inflamed area. Syringing or probing of an acutely inflamed sac is strictly contraindicated because of the risk of damage to the inflamed mucosa resulting in a fibrotic stricture. If untreated in the early stage, acute dacryocystitis may progress to form lacrimal abscess. In such cases, surgical drainage is indicated.

Dacryocystorhinostomy is usually necessary after the acute infection has been controlled and should not be delayed because of risk of recurrent infection.

Chronic dacryocystitis

Presentation is with epiphora which may be associated with chronic or recurrent unilateral conjunctivitis. It may be seen as a painless swelling at the inner canthus caused by a mucocele. Sometimes obvious

swelling may be absent, although pressure over the sac commonly results in reflux mucopurulent material through the canalicular system onto the surface of the eye. Chronic dacryocystitis needs to be treated surgically prior to any intraocular surgeries.

A review of literature from Sattler (1885)[30] to Reddy and Reddy (1955)[31] on bacteriology of dacryocystitis reveals that a good number of organisms have been isolated from the sac-fluid. Of these, *Streptococcus haemolyticus, Bacillus coli, Pneumococcus, Bacillus funduliformis, Staphylococcus, Bacillus typhosus, Morax-axenfeld bacillus, Pneumo-bacillus, Klebs-Loffler bacillus, bacillus Proteus vulgaris, Micrococcus catarrhaliis, Bacillus fusiformis, Pfeiffer's bacillus, Friedlander's bacillus, Koch's bacillus, Bacillus tetragenes, gram negative bacillus, mycotic* organisms have been found in pure cultures; the preponderating organism being the *pneumococcus*. These organisms together with *Staphylococcus* have also appeared in mixed infections. While *Pneumococcus* has been isolated in pure cultures in an overwhelming majority, in mixed infections the *Staphylococcus* has been isolated in preponderating numbers.

Prasad B et al[32] observed bacterial flora in 103 cases of chronic dacryocystitis and compared with the flora of 25 normal cases. They found a fairly good number of organisms in pure cultures and others in mixed state were isolated. Of these organisms, *Staphylococcus* (all varie-

ties), *Streptococcus* (all varieties), *Pneumococcus, Diphtheroids*, were isolated in descending order of frequency.

Bale RN[33] did a study of 100 consecutive cases of dacryocystitis, of which 43 were bilateral and 57 unilateral (total 143 eyes). It was found that the disease was more prevalent in females (57 per cent) than in males. The incidence of affection of left and right eyes was equal The disease has its commencement at 30 years age and maximum incidence in the 5th decade.The common organisms were *D pneumonae, Coagulase negative Staphylococci, Niesseria catarrhalis, Coagulase positive Staphylococci and Klebsiella.* Mixed organism infection is not uncommon.

Briscoe D et al,[34] did a prospective study on changing isolates and antibiotic sensitivities of purulent dacryocystitis. The most common isolates were *Pseudomonas* (22%), *Staphylococcus* (13%), *Enterobacter* (10%), *Citrobacter* (10%), *Streptococcus pneumonia*, *E.coli* and *Enterococcus* (7%).

Brooke et al (1998),[34] reported that both aerobic and anaerobic bacteria may cause dacryocystitis. In newborn anaerobic bacteria such as *Bacteroidecaeae, Fusobacter, Peptostreptococcus and Prevotella* cause dacryocystitis.

Huber Spitzy V et al,[36] reported *Staphylococcus* as the most common organism. Also a significant number of gram negative bacilli were isolated of which *E.coli* was the most frequently grown.

Umesh Bareja et al,[37] in their study on 114 eyes, in which 57.9% constituted gram positive cocci, found that the most effective antibiotic was cloxacillin with efficacy of 77%.

Sun X. et al,[38] investigated a total of 100 samples obtained from lacrimal duct in 91 consecutive patients with chronic dacryocystitis, *Staphylococcus* species represented 34.5% of all strains, followed by *Corynebacterium diphtheroids* (15.5%). The sensitive test revealed levofloxacin, ofloxacin and amikacin were the most effective antibiotics.

Usha kim,[39] studied 238 samples of dacryocystitis. Positive cultures were obtained from 197 samples and no growth in 41 samples. Of the positive cultures 124 were of gram positive organism and 93 were gram negative. The gram positive organisms were sensitive to chloramphenicol (98%),vancomycin (82%) and ofloxacin (75%). The gram negative organisms were sensitive to ofloxacin (83%), ciprofloxacin (81%), chloramphenicol (65%),gentamicin (60%), tobramycin (57%), amikacin(50%).

MJ Bharathi et al,[40] studied that the commonest organisms causing acute dacryocystitis are *Staphylococcus aureus*(22.3%) and *Pseudomonas* (16%). In case of chronic dacryocystitis the organisms were

Staphylococcus aureus (10.8%) and *Streptococcus pneumonia* (8.7%)The proportions of *Staphylococcus aureus* and *Pseudomonas spp* are higher in causing acute dacryocystitis, while the proportion of *Coagulase negative Staphylococcus aureus* is higher in chronic dacryocystitis. The percentages of antibacterial resistant isolates were higher among bacterial species from chronic dacryocystitis.

Surgical management for NLD obstruction

The type of surgery depends on the level of obstruction

- Obstruction at NLD or junction of NLD and sac - DCR
- Obstruction at internal punctum or common canaliculus – DCR with silicone tubes
- Canalicular obstruction at or beyond 8 mm from the punctum – canaliculo DCR
- Obstruction less than 8mm from punctum in both canaliculi – conjunctivo DCR

Dacryocystorhinostomy is of three types

- Conventional DCR
- Endonasal DCR
- Laser assisted DCR (transcanalicular and endonasal)

Conventional DCR

It involves the anastomosis between the medial wall of the lacrimal sac and nasal mucosa through a bony ostium

Indications

- NLD block in adults, chronic dacryocystitis and mucocele
- NLD block in children not responding to probing and lacrimal intubation
- Partial block in significantly symptomatic patients
- As part of conjunctivo and canaliculo DCR

Contraindications

- Malignancy of lacrimal sac
- Dry eye syndrome
- Blood dyscrasias
- Acute dacryocystitis
- Children below 3 years
- Atrophic rhinitis
- Rhinosporidiosis

Preoperative work up

- Hb
- Urine analysis
- Bleeding time, clotting time
- Blood pressure
- Blood sugar

- ENT examination to be done to rule out atrophic rhinitis, turbinate hypertrophy, deviated nasal septum, nasal polyps , malignancy
- Adequate treatment of acute dacryocystitis
- NSAIDS and anticoagulates should be stopped 3 days prior to surgery
- Should start instillation of antibiotic eye drops and nasal decongestants in ipsilateral nostril twice a day for 3 days prior to surgery. Sedatives may be given to relieve anxiety of the patient

Nasal packing

It helps in mucosal decongestion by pressure and vasoconstriction. Nasal pack consists of half inch wide and 16 inches long ribbon gauze soaked in xylocaine 2% with adrenaline. Naphazoline drops are instilled into the nasal cavity. The ipsilateral nasal cavity is packed under direct visualization using nasal speculum and packing forceps.

Surgical technique

Syringing is done wih methylene blue dye. This stains the sac and makes identification of sac easier. Incision is made through the skin within, 8 to 10 mm from the medial canthus on the side of the nose, starting 2mm above the level of medial canthus and extending 4mm towards the ala of the nose. The skin edges are handled properly and dissection is carried down to the periosteum. Direct bone incision can also be taken by avoiding damage to angular vessels. Place traction suture

with 4.0 silk in each flap. Identify and expose the anterior limb of medial palpebral ligament. It maybe cut or just dissected out.

Expose the periosteum over the anterior lacrimal crest and above it. Incise it 3 to 4 mm anterior and parallel to the anterior lacrimal crest. Reflect the periosteum from underlying bone and reach upto the anterior lacrimal crest. With the blunt end of the lacrimal sac dissector force a hole in the thin bone at the junction of lacrimal bone with the frontal process of maxilla in the centre or in posterior third of the lacrimal fossa. Fracture out a small piece to allow the finest bone punch into the hole and gradually enlarge the opening until the whole of lacrimal fossa is removed thus exposing the nasal mucosa. Anterior and posterior flaps are made in the lacrimal sac and in the nasal mucosa by an H-shaped incision. The posterior flaps are sutured together with 1 to 3 interrupted 5-0 chromic catgut sutures using half circle needle. Similarly the anterior flaps are sutured with sufficient tension on the flap to prevent it from collapsing. If MPL is incised it should be sutured with 4-0 or 5-0 vicryl. Skin is sutured with 5-0 prolene using continuous or interrupted sutures.

Complications of DCR

- Hemorrhage – intranasal bleeding from nasal mucosa requires nasal packing for 24 hours. Injection ethamsylate or vitamin K may be given
- Failed DCR - may be due to

  1. Small osteotomy

2. Blockage of anastomosis due to improper suturing, redundant flaps, bony fragments, post operative hematoma
3. Post operative soft tissue infection

- Sump syndrome

Management of failed DCR

- Patients with mucopurulent discharge – repeat DCR with silicone tube intubation
- In case of common canalicular block– canaliculo-DCR with silicone tube intubation
- In case of canalicular block – conjunctivo- DCR

Endonasal DCR[18,19]

Indications

- Chronic dacryocystitis with NLD block
- Mucocele

Contraindications

- Lacrimal sac tumours
- Dacryoliths

Procedure

The operation is performed with the patient under local anaesthesia. The nose is packed with a solution containing 2 ml of 1:1000 epinephrine with xylocaine. The packing is left in the nose for 10 minutes. A 20- gauge illuminated fibreoptic light probe is passed through

the upper or lower canaliculus into the lacrimal sac. The light is located endoscopically on the lateral wall of the nose, and its position is noted. A 1 cm diameter circle of mucosa is removed at the site of transillumination to expose the underlying bone. Osteotomy is made using curette, punch, chisel, electric burr and lasers. In laser assisted procedures[20] the laser used to make the osteotomy are Holmium YAG and Argon laser (blue green). The lacrimal sac is opened with a 45° cutting forceps, and the opening is enlarged to approximately 1 cm. Metal stents attached to the silastic tubing at either end are passed through the upper and lower canaliculi . This helps in maintaining patency as the flaps are not anastomosed in this procedure.

Advantages

- No cutaneous scar
- Bloodless surgery
- Speedy recovery
- Day care procedure
- Medial canthal anatomy is not disturbed
- Bilateral DCR can be done in the same sitting

Disadvantages

- High cost
- Steep learning curve

- Intranasal manipulations needed at times like inferior turbinate fracture or septoplasty

Canaliculo DCR

This procedure is done in cases with obstruction of common canaliculus. Following skin incision, dissection is carried out till the MPL. The common canaliculus is freed from the medial canthal tendon and all pericanalicular fibrous tissue is excised thoroughly. The most medial patent part of common canaliculus is intubated from the punctum by two ends of a silicone tube. The common canaliculus is sutured to the flaps of the lacrimal sac and DCR completed as usual.

Very often the sac is also scarred and the patent canalicular remnant may be sutured directly to the nasal mucosa. However a minimum of 8 mm of the canalicular system must be present to allow this anastomosis without undue tension. If less than 8 mm of the canalicular system is patent then conjunctivo DCR is considered

Conjunctiva DCR

Jones[21] described a procedure to treat patients with canalicular block by creating an artificial channel between the conjuncival sac and the middle meatus . The surgical procedure is the same as in conventional DCR until the posterior sac and nasal mucosal flaps are sutured. Thereafter the caruncle is resected and a 23 gauge curved hypodermic needle is entered in the conjunctiva 2 mm from the canthal angle so as to

reach the lacrimal sac. A Lester Jones tube is then advanced through this track to reach the lacrimal sac. The anterior flaps and nasal mucosa are then sutured together and DCR completed as usual.

An important aspect in postoperative care is educating the patients regarding care of tube and prevention of its extrusion. Extrusions are managed by immediate replacement.

Balloon catheter dilatation

Becker et al[22] described this method which is effective in both congenital and acquired nasolacrimal duct obstruction. A guide wire is passed into the lacrimal sac over which a balloon catheter is guided and inflated. This is done twice for 10 minutes. Success rate is around 95% in congenital cases and 70% in acquired cases.

Dacryocystectomy

DCT was first described by Woolhouse in 1724 as a treatment for recurrent dacryocystitis secondary to acquired nasolacrimal duct obstruction[23]. However, after the introduction of DCR surgery, the use of DCT declined. At present, the main indication for DCT is excision of lacrimal sac tumours. However, other less common indications are recurrent dacryocystitis due to inflammatory causes such as Wegener's granulomatosis when there is a risk of subsequent naso-cutaneous fistula formation following DCR surgery[24] or recurrent dacryocystitis without epiphora[25,26].

DCT differs from DCR surgery in that there is no osteotomy or breaching of the nasal mucosa and hence there is less risk of aspiration pneumonia due to intraoperative nasal haemorrhage[27]. Secondly, DCT is a safer procedure to perform on a frail, elderly patient than DCR as the surgical time is much shorter than that of external DCR surgery and the type of local anaesthesia required is safer in DCT. In DCR surgery under local anaesthesia, it is necessary to pack the nose with either cocaine or local anaesthetic and nasal decongestant and or vasoconstrictive agent to prevent haemorrhage as well as infiltrate the lacrimal fossa with local anaesthetic and a vasoconstrictor. These agents can have significant systemic effects on frail, elderly patients, with exacerbation of systemic hypertension, tachycardia, dysarrhythmia, and a risk of myocardial toxicity due to their sympathomimetic action[28,29]. DCT can be performed with standard local infiltration of the medial canthal area with lidocaine and adrenaline alone without the need for nasal packing. The procedure involves identification and excision of the lacrimal sac.

MATERIALS AND METHODS

The study of microbiological profile in chronic dacryocystitis and their susceptibility and resistance to antibiotics in South Tamil Nadu was carried out in the Department of Ophthalmology, Tirunelveli Medical College, Tirunelveli.

Settings	:	Ophthalmology ward, microbiological lab
Study design	:	Single centre observational prospective hospital based study
Period of study	:	June 2009 to June 2010
Ethical approval	:	Obtained

Tirunelveli Medical College Hospital is a tertiary care centre in South Tamil Nadu. The patient population is a fairly representative sample of the disease pattern in this region.

Inclusion Criteria:

Patients between 16-80 years of age.

All patients with complaints of mucopurulent discharge, epiphora, and sac abscess were included in this study.

Exclusion Criteria:

Patients less than 16 years of age.

Patients with acute dacryocystitis, lacrimal abscess and mucocele were excluded from the study.

Those who have been treated with systemic or topical antibiotics within 1 week of presentation were excluded from the study.

All cases of pseudoepiphora and epiphora caused by diagnoses other than nasolacrimal duct obstruction were also excluded from this study.

Procedure

Specimens for microbiological analysis were obtained by wiping a broth-moistened swab across the lower conjunctival cul-de-sac and also from everted punta by applying pressure over the lacrimal sac area. Surgically excised lacrimal sacs were collected and were also subjected to microbiological analysis. Those cases with mucoid or mucopurulent discharge on syringing of the lacrimal sac were advised surgery. In patients undergoing dacryocystectomy, a prior ENT clearance was obtained and the sacs were collected intraoperatively and subjected to microbiological examination.

The material obtained was initially inoculated directly onto the surface of the solid media such as sheep's blood agar,chocolate agar, and Sabouraud's dextrose agar and also inoculated into the depth of liquid media such as brain heart infusion broth and thioglycollate medium. The material obtained was also smeared onto clean, sterile labelled glass slides for 10% potassium hydroxide wet mount, Gram stain, Giemsa stain, Ziehl-Neelsen acid-fast stain, and Kinyoun's acid-fast stain. All

inoculated media were incubated aerobically. The inoculated Sabouraud's dextrose agar was incubated at 27°C, examined daily, and discarded at 3 weeks if no growth was seen. The inoculated blood agar, chocolate agar, thioglycollate broth, brain–heart infusion broth were incubated at 37° C, examined daily, and discarded at 7 days if growth was not seen.

Microbial cultures were considered significant if

- Growth of the same organism was demonstrated on more than one solid-phase medium.

or

- There was confluent growth at the site of inoculation on one solid medium.

or

- Growth of one medium was consistent with direct microscopy findings (ie, appropriate staining and morphology with Gram stain)

or

- The same organism was grown from more than one specimen.

The specific identification of bacterial isolates were performed based on microscopic morphology, staining characteristics, and biochemical properties using standard laboratory criteria.13 Standardized bacterial inoculums for susceptibility testing was prepared from 4–5 well-isolated colonies of the same morphological type in 5ml of peptone water.

The broth culture was then allowed to incubate at 37°C until a slightly visible turbidity appeared (usually 2–5 h), and the turbidity of the inoculum was compared with 0.5 Macsarland standard. Standardized bacterial inoculum was inoculated on the Mueller–Hinton agar using a sterile, non-toxic swab evenly over the entire surface of the agar plate to obtain a uniform inoculum. Blood agar was used for Streptococci and other fastidious bacteria. The inoculated plates were then allowed to dry for 3–5 min. The antibacterial impregnated discs were applied with a gap of 24mm between them and the plates were incubated at 37°C within 15 min after applying these discs.

Antibacterial discs (obtained from Hi-media Laboratories Pvt Ltd, Mumbai, India) were consistently tested for efficacy against standard American Type Culture Collection (ATCC) bacteria (S. aureus ATCC 25923, S.pneumoniae ATCC 49619, Haemophilus influenzae ATCC 49241, Pseudomonas aeruginosa ATCC 27853, Escherichia coli ATCC 25922) as a general quality control laboratory procedure. After 16–18 h of incubation, the plates were examined and the diameter of the zones of complete inhibition were measured by a ruler. When blood agar was tested, the susceptibility was measured by measuring the area where haemolysis did not occur.The zone diameter for individual antimicrobial agent was translated into sensitivity and resistant categories by referring to an interpretative chart as per the recommendation of the NCCLS.

The results of the study were compared in respect of their age, sex microbiological spectrum, antibiotic sensitivities and interpreted by the Students ‘t’ test. S.P.S.S package (13.0) was utilized for the calculations of mean , standard deviation and percentages. The P value ($P<0.05$) was considered as significant.

OBSERVATION AND RESULTS

An observational prospective study of the microbiological profile in chronic dacryocystitis and their susceptibility and resistance to antibiotics was carried out at Tirunelveli Medical College Hospital. A total of 110 eyes of 100 patients were studied in respect of their mean age, sex, duration of symptoms, patency of duct, microbiological profile, antibiotic susceptibility and treatment procedures. Of the 100 patients 36 were males and 64 were females. The mean age of presentation of chronic dacryocystitis among males was 62.2 $\pm$ 13.8 whereas that among females was 59.5 $\pm$ 12.8. A total of 200 eyes of 100 patients were considered and on syringing 110 had regurgitation of pus, 37 had regurgitation of clear fluid and 53 ducts were patent. Of the 110 eyes with infection positive culture was obtained from 85 (77.3%) eyes and no growth was observed in 25 (22.7%) eyes. A total of 92 (83.6%) eyes underwent DCT and 18 (16.4%) eyes underwent DCR. The patients were followed up and found to be asymptomatic.

Table : 1

Percentage distribution of the patients according to their sex

Total number of patients	Total number of male patients	Total number of female patients
100	36	64

The percentage distribution of the patients in table 1 reveals that the incidence of chronic dacryocystitis is more (64%) among females than males (36%).

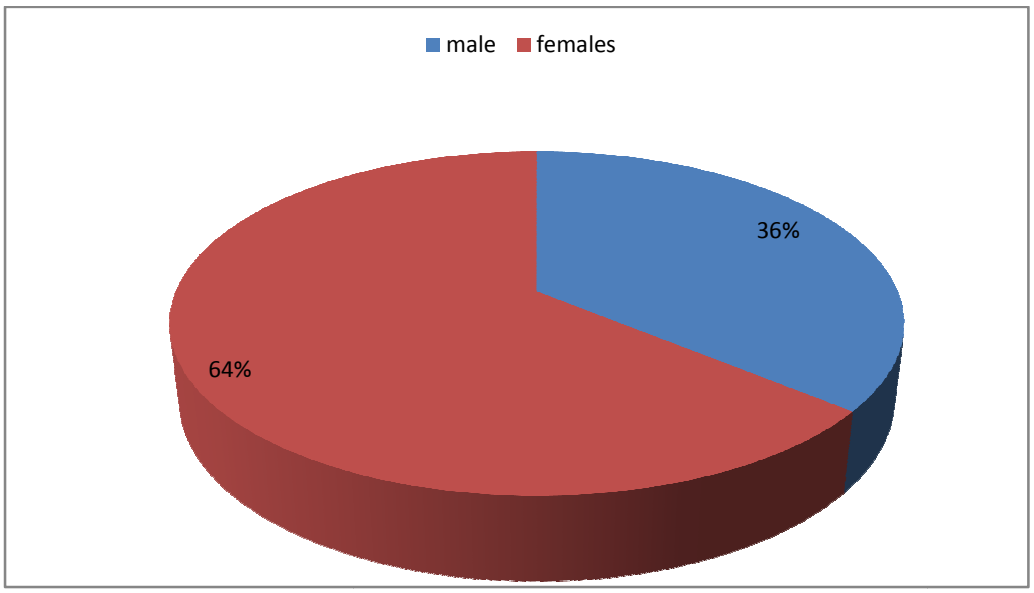


Table : 2

Age and sex distribution of the patients

Age group	Male		Female		Total	
	No	%	No	%	No	%
30-39	4	11.1	8	12.1	12	12.0
40-49	2	5.5	2	3.1	4	4.0
50-59	2	5.6	13	20.3	15	15.0
60-69	17	47.2	27	42.2	44	44.0
70-79	7	19.4	11	17.2	18	18.0
80-89	4	11.1	3	4.7	7	7.0
Total	36	100.0	64	100.0	100	100.0
Median (range)	63.5 (32- 83)		62.5 (31 – 82)		63 (31 – 83)	
Mean $\pm$ S.D.	62.2 $\pm$13.8		59.5 $\pm$12.8		60.5 $\pm$13.2	
't' value	0. 969		d.f = 98		-	
significance	P > 0.05				-	

The above table describes the median age of males to be 63.5 years and that of females 62.5 years. The mean ages of males and females were 62.2 $\pm$13.8 and 59.5 $\pm$12.8 years respectively. The difference between the mean age of the sexes was not statistically significant (P > 0.05)

Comparison of age and sexwise distribution of chronic dacryocystitis

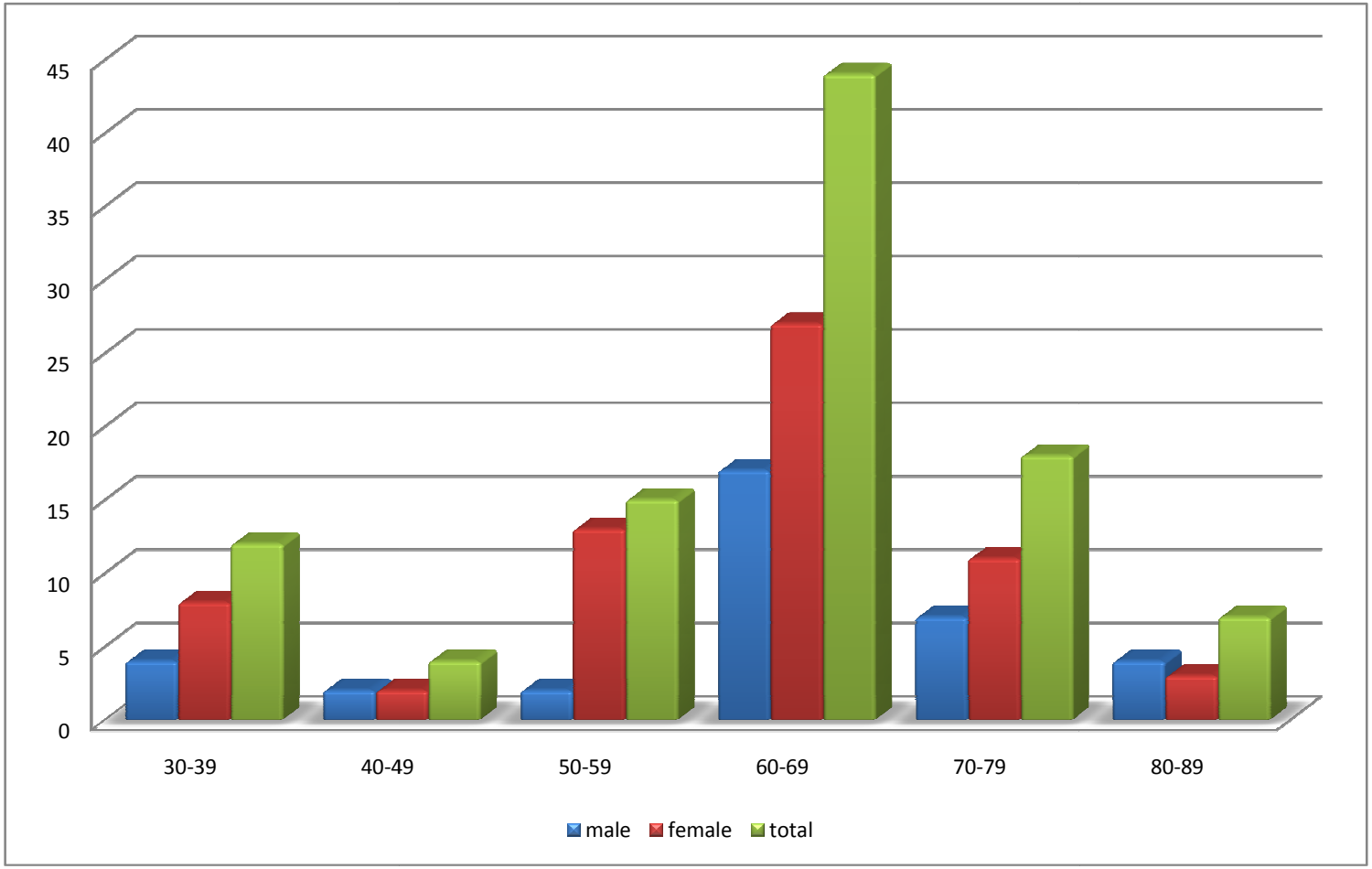


Table 3

Comparison of the sexwise distribution of chronic dacryocystitis

Duration (months)	Male		Female		Total	
	No	%	No	%	No	%
0-10	20	55.5	43	67.2	63	63.0
10-20	11	30.5	14	21.9	25	25.0
20-30	2	5.6	4	6.3	6	6.0
30-40	2	5.6	1	1.5	3	3.0
40-50	1	2.8	2	3.1	3	3.0
Total	36	100.0	64	100.0	100	100.0
Median (range)	8.5 (4 - 46)		8 (3 – 42)		8 (3 – 46)	
Mean $\pm$ S.D.	12.4 $\pm$9.9		10.7 $\pm$10.7		11.3 $\pm$9.0	
't' value	0. 905 d.f = 98				-	
significance	P > 0.05				-	

The duration of the disease between the two sexes and total patients were shown in the above table. The difference between the mean duration of dacryocystitis in males (12.4 $\pm$9.9) and females (10.7 $\pm$10.7) was not statistically significant. It was observed that 63% of patients presented within the first 10 months and 25% within the next 10 months.

Comparison of sex wise distribution of chronic dacryocystitis

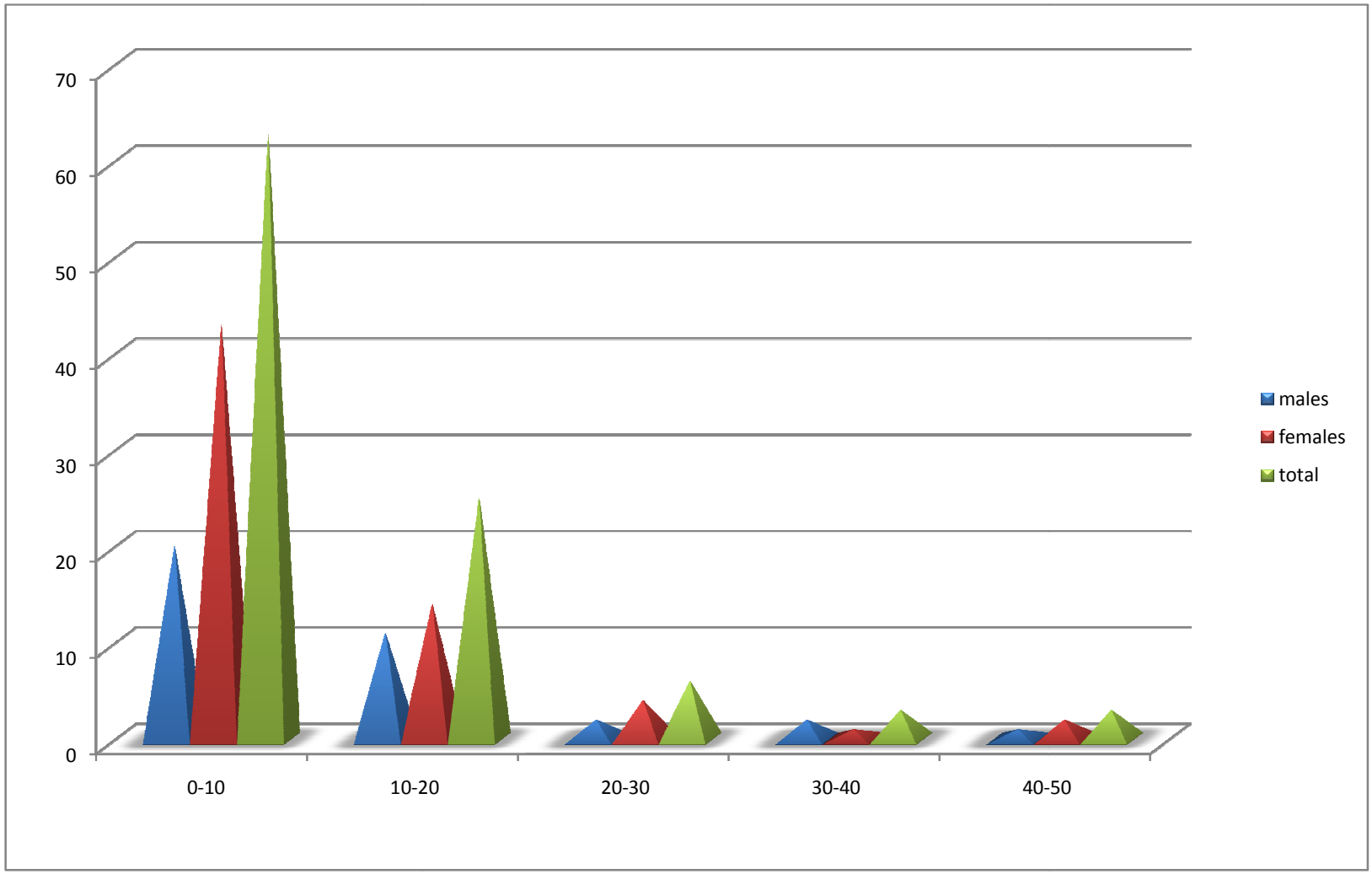


Table : 4

Laterality of dacryocystitis in males and females

Sex	Right side	Left side	Both sides	Total
Males	12 (33.3%)	7(43.7%)	17(54.8 %)	36
Females	24 (66.7%)	9 (56.2%)	31(64.5%)	64
Total	36	16	48	100

The above table shows the side of involvement of dacryocystitis in males and females. In males right eye was involved in 33.3%, left eye in 43.7% and both eyes in 54.8%. In females the incidence in right eye is 66.7%, left eye is 56.2% and both eyes is 64.5% The total incidence in right eye was 36%, incidence in left eye is 16% and involvement of both eyes is 48%.

Sexwise comparison of laterality of chronic dacryocystitis

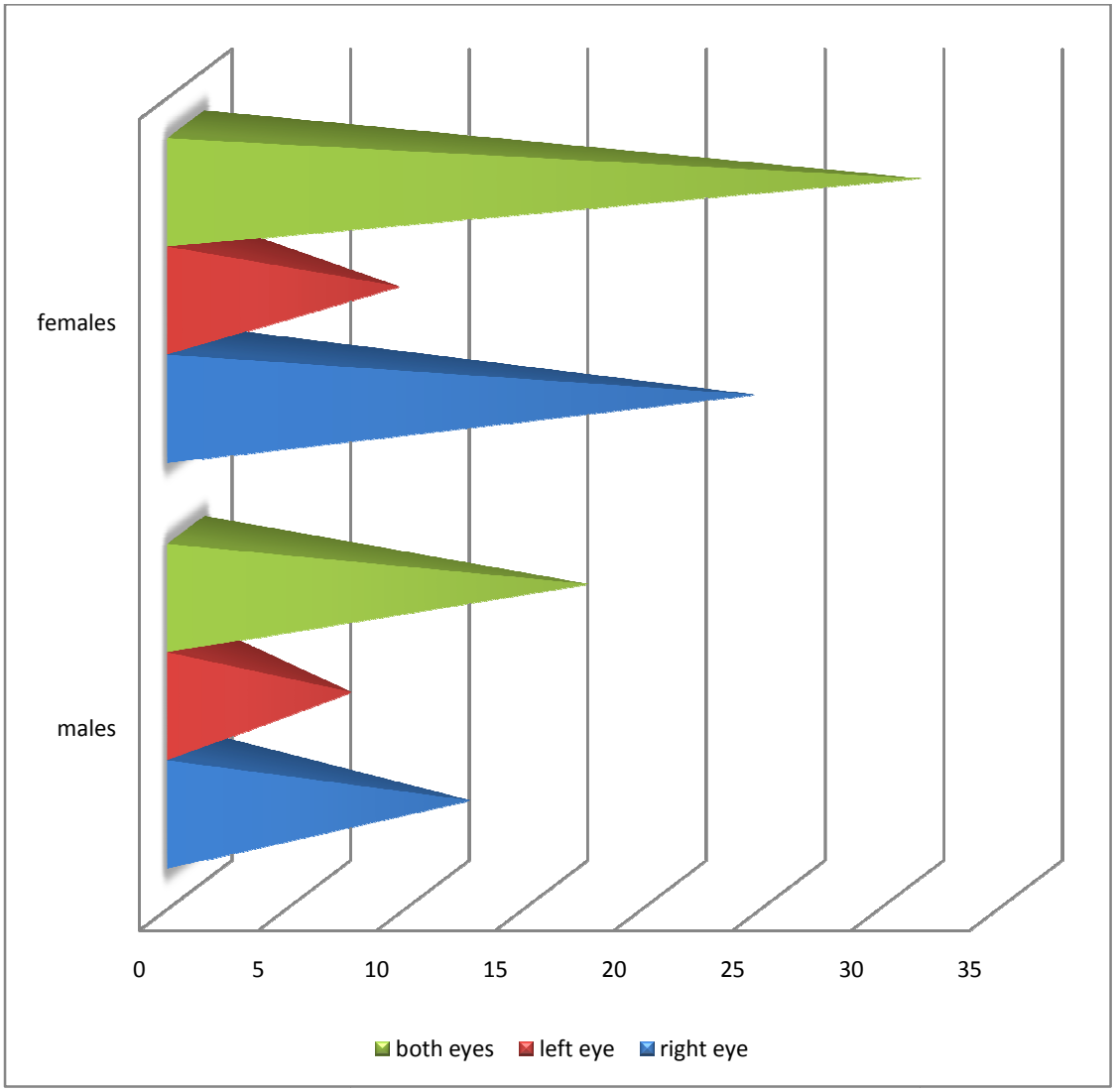


Table 5

Percentage distribution of culture positive and culture negative results

Category	Culture positive									Culture negative (no growth)	Total
	Gram positive			Total	Gram negative				Total		
	Cons	Staph	Strep		Pseudo	Kleb	E.Coli	Hemo			
No. of eyes	32	22	13	67	7	6	2	3	18	25	110
Percentage	29.1	20.0	11.8	60.9	6.4	5.5	1.8	2.7	16.4	22.7	100

The culture reports of the 110 eyes is shown in the above table. Among the 110 eyes samples from 25 (22.7%) eyes showed no growth. The remaining 85 (77.3%) eyes showed growth. Of the 85 eyes gram positive organisms were found in 67 (60.9%) eyes and gram negative organisms in 18 (16.4%). 32 eyes (29.1%) had *Coagulase negative Staphylococcus,* 22 eyes (20.0%) had *Staphylococcus aureus*, 13 eyes (11.8%) had *Streptococcus species*,7 eyes (6.4%) had *Pseudomonas aeruginosa*, 6 eyes (5.5%) had *Klebsiella* species, 2 eyes (1.8%) had *Escherichia coli* and 3 eyes had *Hemophilus* species.

Distribution of culture positive and culture negative results

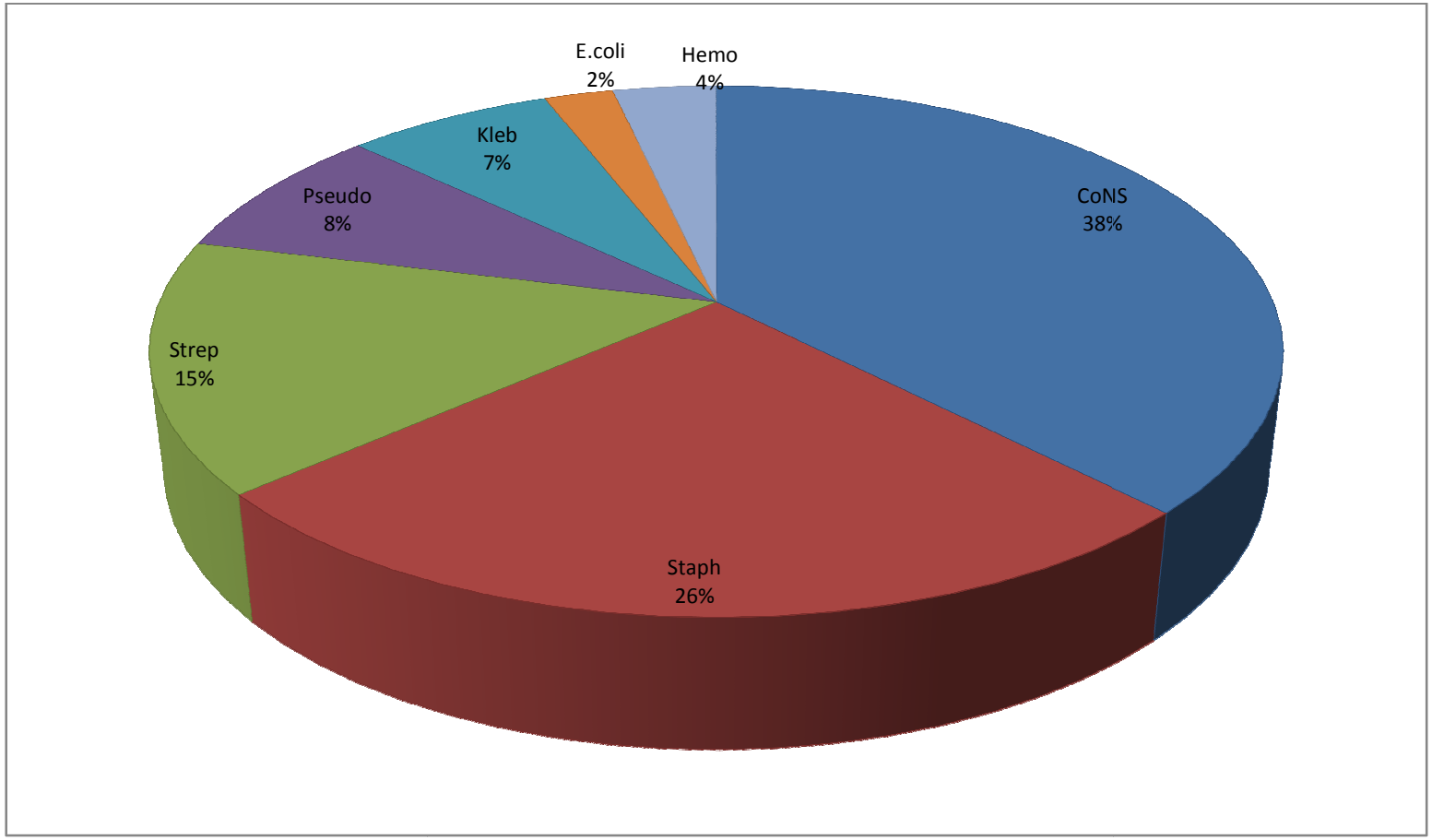


Table 6

Surgical treatment of chronic dacryocystitis

Total number of patients	Total number of patients undergoing DCT	Total number of patients undergoing DCR
110	92	18

This table shows the surgical treatment done for those cases which had regurgitation of pus on syringing. DCR was done in 18 eyes (16.4%) and DCT was done in 92 eyes (83.6%).

Surgical treatment of chronic dacryocystitis

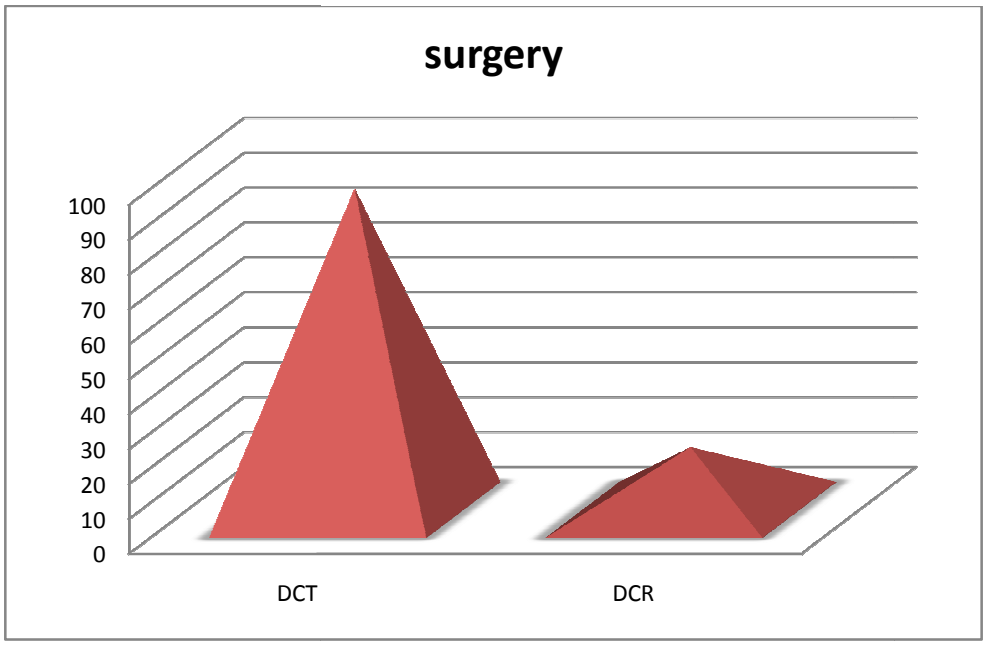


Table 7

Association between age and surgical procedure done

Treatment	Age of patients						X^2 (chi-square)	d.f.	significance
	< Median		Median +		Total				
	No.	%	No.	%	No.	%			
DCR	16	88.9	2	11.1	18	100.0	15.05	1	P<0.001
DCT	33	35.9	59	64.1	92	100.0			
Total	49	44.5	61	55.5	110	100.0			

The above table shows that the age was associated with the surgical procedure done. DCR was done for younger patients and DCT was done for older patients. The association was statistically very highly significant (P<0.001).

Association between age and the surgical procedure done

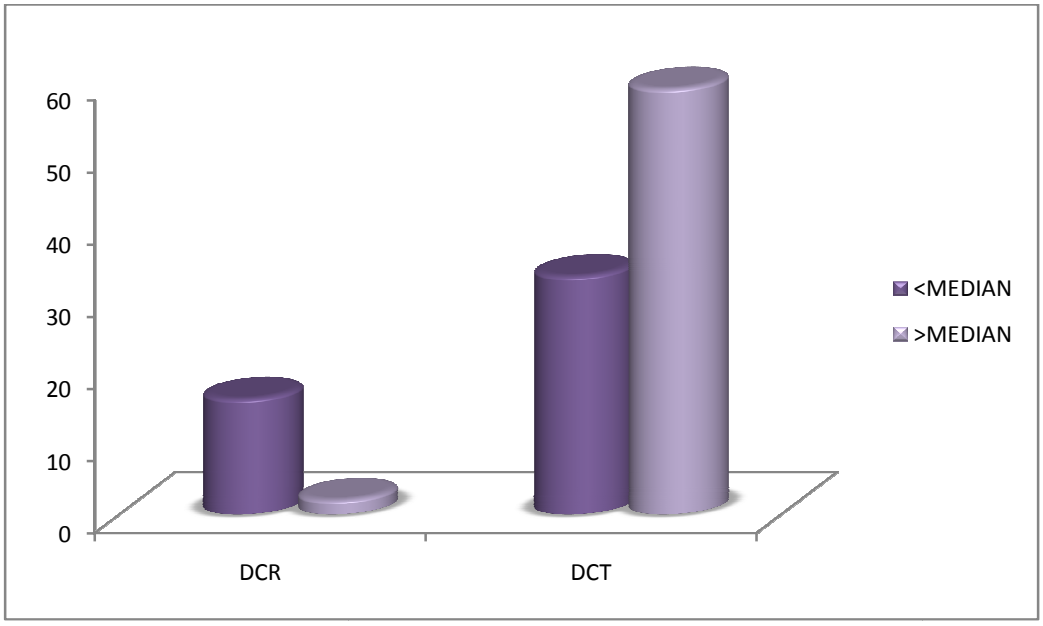


Table 8
Percentage distribution of sensitivity of different antibiotics to organisms

S.no	Drug	CoNS n=32		Staph n=22		Strep n=13		Pseudo n=7		Kleb n=6		E.coli n=2		Hemo n=3		Total n=85	
		No	%	no	%	no	%	no	%	no	%	no	%	no	%	no	%
1	GA	31	96.9	21	95.6	12	92.3	1	14.3	5	83.3	2	100.0	0	0	72	84.7
2	M	28	87.5	19	86.4	12	92.3	0	0	5	83.3	1	50.0	0	0	65	76.5
3	C	27	84.4	18	81.8	10	76.9	1	14.3	5	83.3	1	50.0	0	0	62	72.9
4	V	23	71.9	15	68.2	10	76.9	1	14.3	3	50.0	0	0	0	0	52	61.2
5	O	16	50.0	10	45.5	9	69.2	6	85.7	5	83.3	2	100.0	3	100.0	51	60.0
6	CZ	26	81.3	17	77.3	8	61.5	7	100.0	6	100.0	1	50.0	3	100.0	68	80.0
7	A	26	81.3	16	72.7	4	30.8	4	57.1	4	66.7	2	100.0	0	0	56	65.9
8	T	21	65.6	14	63.6	5	38.5	7	100.0	4	66.7	1	50.0	3	100.0	55	64.7
9	GM	16	50.0	10	45.5	3	23.1	1	14.3	4	66.7	1	50.0	3	100.0	38	44.7
10	CF	15	46.9	11	50.0	9	69.2	4	57.1	6	100.0	1	50.0	3	100.0	49	57.6

The sensitivity of the drugs to the organisms is shown in the above table. Bacterial isolates showed higher sensitivity to Gatifloxacin (84.7%) followed by Cefazolin (80%), Moxifloxacin (76.5%) and Ciprofloxacin (72.9%). Least sensitive among the ten drugs was Gentamicin (44.7%).

Percentage distribution of sensitivity of different antibiotics to organisms

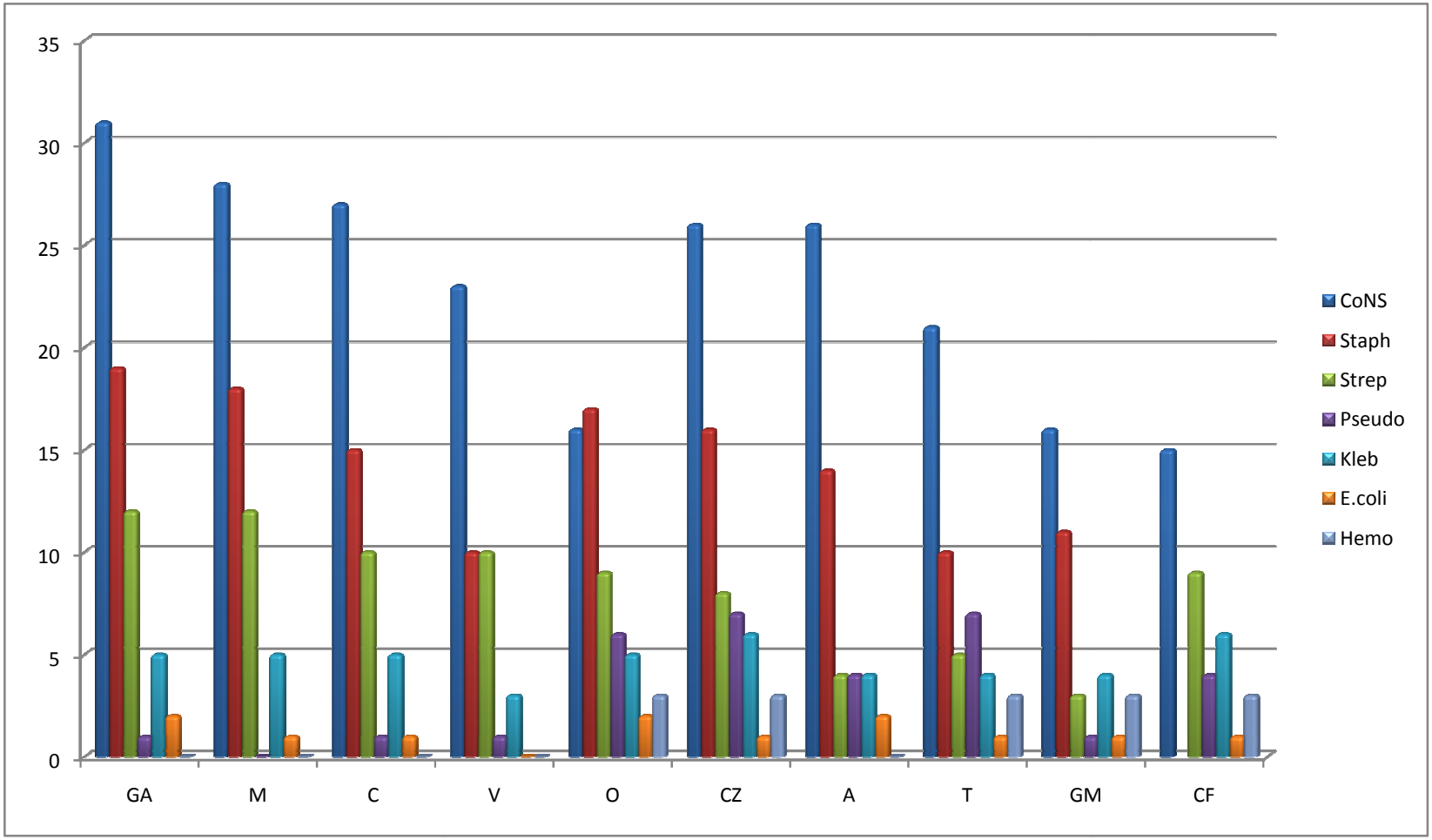


Table 9

Comparison of distribution of percentages of antibiotic sensitivity among Gram positive and Gram negative organisms

S.no	Drug	Gram positive n=67		Gram negative n=18		't'	significance
		no of organism	%	no of organism	%		
1	GA	64	95.5	8	44.4	4.265	P<0.001
2	M	59	88.1	6	33.3	4.647	P<0.001
3	C	55	82.1	7	38.9	3.481	P<0.001
4	V	48	71.6	4	22.2	4.359	P<0.001
5	O	35	52.2	16	88.9	3.825	P<0.001
6	CZ	51	76.1	17	94.4	2.434	P<0.05
7	A	46	68.7	10	55.5	1.014	P>0.05

The comparison of sensitivity of antibiotics between gram positive and gram negative organisms is shown in the above table. Gram positive bacteria were more sensitive to gatifloxacin, moxifloxacin, ciprofloxacin and vancomycin. The above sensitivities were statistically very highly significant (P<0.001). The antibiotics such as ofloxacin, cefazolin, tobramycin and cefotaxime had more sensitivity with gram negative than gram positive organisms and the sensitivities were statistically significant (P<0.05). The antibiotics amikacin and gentamicin had no significant sensitivity with either gram positive or gram negative organisms(P>0.05).

Comparison of distribution of percentages of antibiotic sensitivity among Gram positive and Gram negative organisms

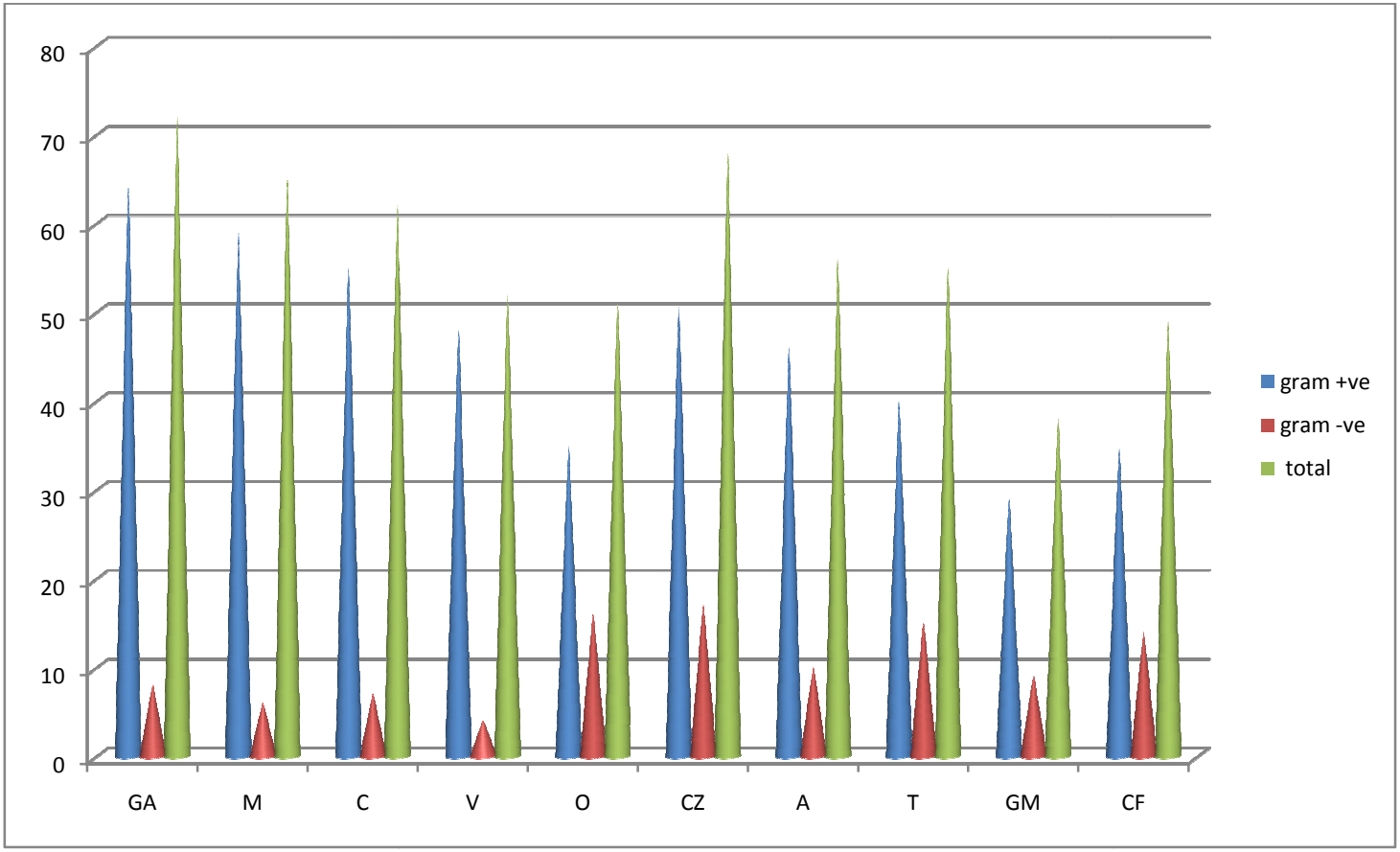
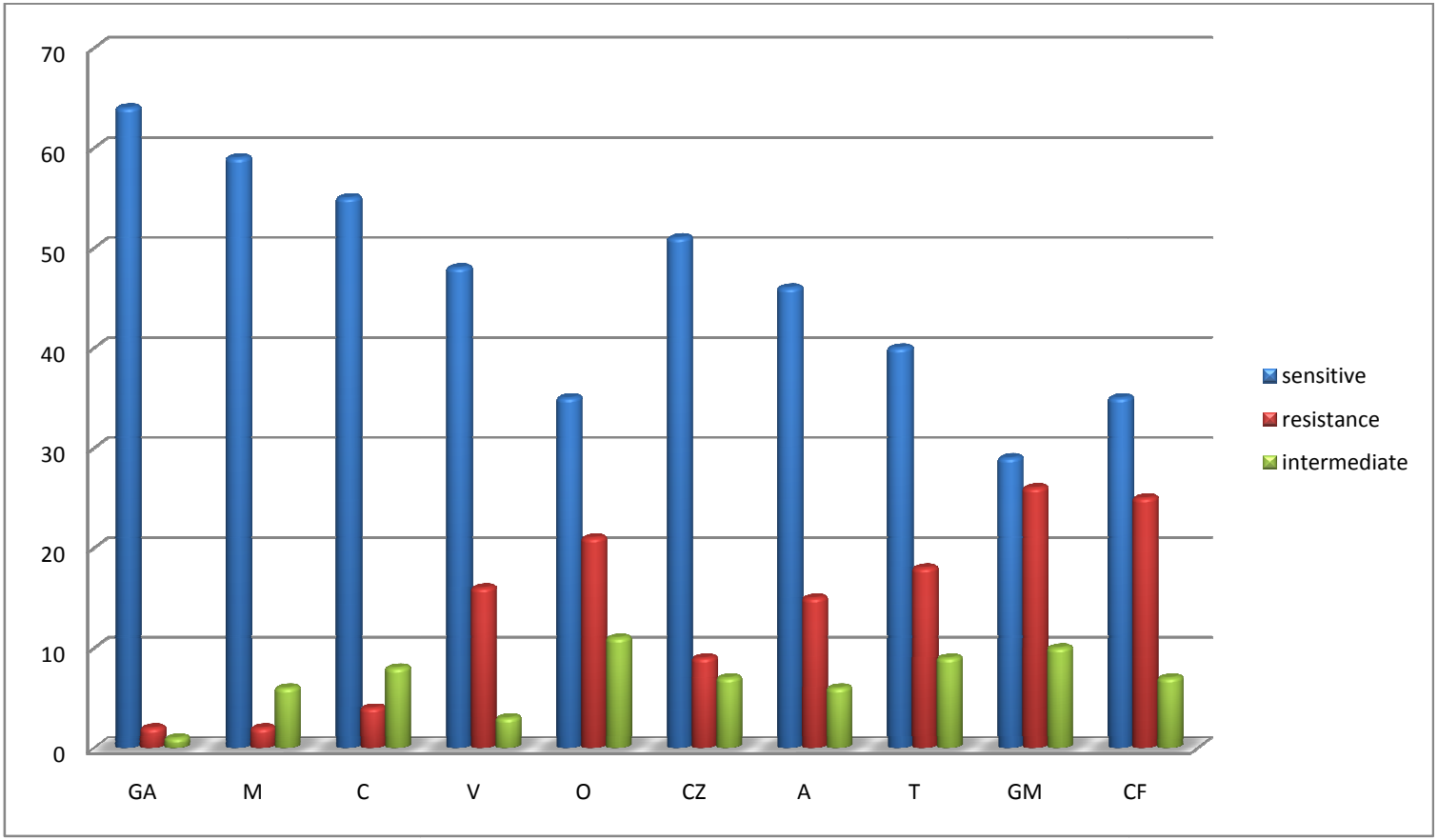


Table 10
Analysis of invitro resistance pattern

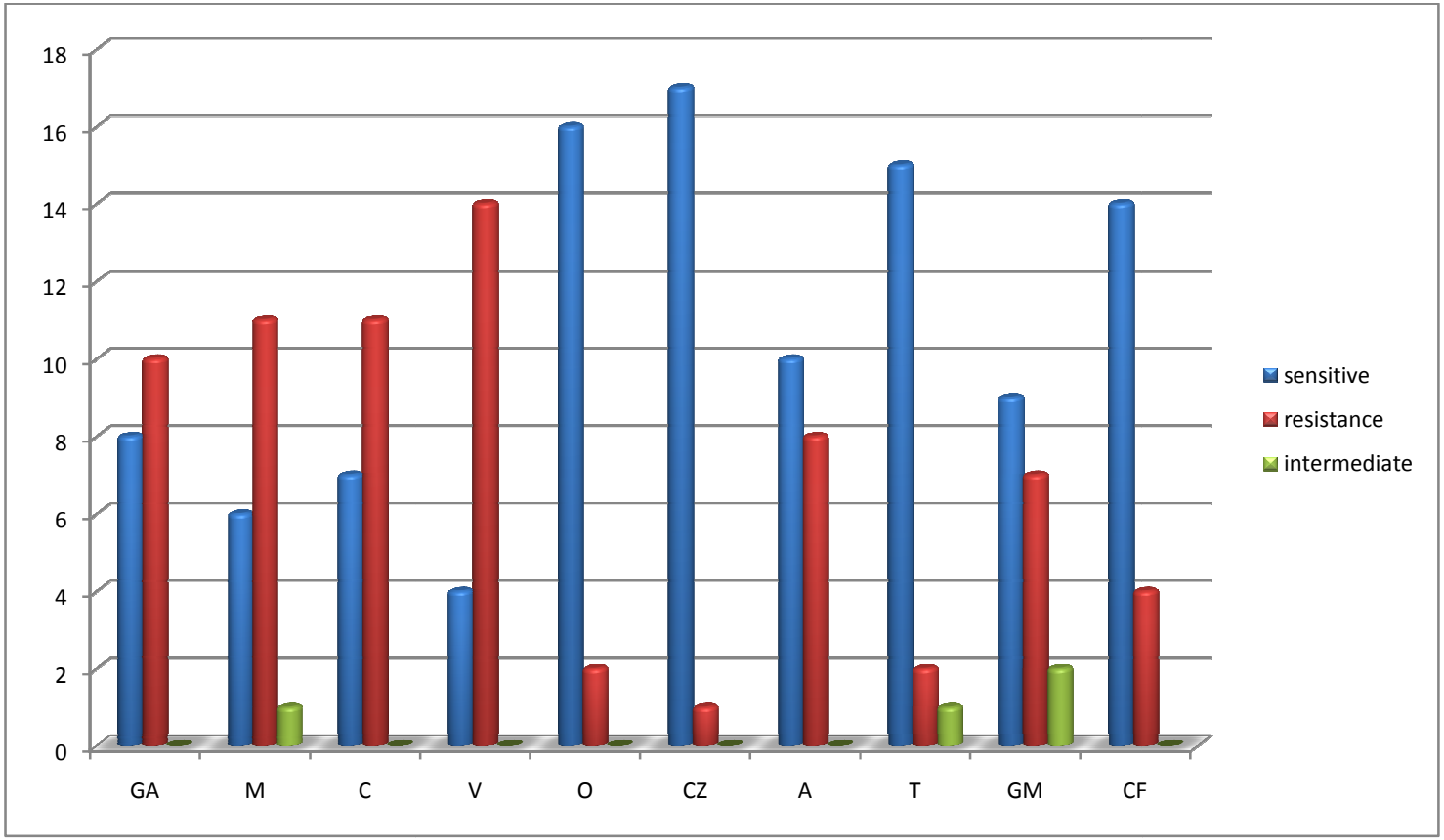
s.no	Drug	Gram positive n = 67						Gram negative n = 18					
		Sensitivity		Resistance		Intermediate		Sensitivity		Resistance		Intermediate	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	GA	64	95.5	2	3.0	1	1.5	8	44.4	10	55.6	0	0
2	M	59	88.1	2	3.0	6	8.9	6	33.3	11	61.6	1	5.6
3	C	55	82.1	4	6.0	8	11.9	7	38.9	11	61.6	0	0
4	V	48	71.6	16	23.9	3	4.5	4	22.2	14	77.8	0	0
5	O	35	52.2	21	31.3	11	16.4	16	88.9	2	11.1	0	0
6	CZ	51	76.1	9	13.4	7	10.5	17	94.4	1	5.6	0	0
7	A	46	68.7	15	22.4	6	8.9	10	55.5	8	44.4	0	0
8	T	40	59.7	18	26.9	9	13.4	15	83.3	2	11.1	1	5.6
9	GM	29	43.3	26	38.8	10	14.9	9	50.0	7	38.9	2	11.1
10	CF	35	52.2	25	37.3	7	10.5	14	77.8	4	22.2	0	0

The in vitro resistance analysis is shown in the above table. Gram positive organisms showed high resistance to the antibiotics namely gentamicin (38.8%), cefotaxime (37.3%), ofloxacin (31.3%), tobramycin (26.9%), vancomycin (23.9%) and amikacin (22.4%). Gram negative organisms showed high resistance to the drugs gatifloxacin (55.6%), moxifloxacin (61.1%) ciprofloxacin (61.1%) and vancomycin (77.8%) which showed high sensitivity with gram positive organisms.

Analysis of invitro resistance in gram positive organisms



Analysis of invitro resistance in gram negative organisms



DISCUSSION

Sex distribution

The number of male patients in our study was 36 and females 64. Thus there was a female preponderance.

Duke – Elder[1,41] states that while the disease in newborn, affects both sexes equally, its occurrence among adults is in the ratio of 75-80% - females to 25-30% - males. Meller (1929) Ruiz Barranco and Martinez Roman (1966) stated that this difference was due to a narrower bony nasolacrimal canal in females.

Heinoven (1920) blamed that the high incidence amongst females is due to the fact that females had a higher nasal index.

Bharathi MJ et al,[40] in his study found overall female to male ratio was 3.9:1 and females (80.9) were more in number than males (19.1) The incidence of dacryocystitis in females had been recorded by Traquair[41] as 83 percent by Summer Skill, W. Ft [43] as 73 per cent , Sood et al [44] as 63.3 percent and by Bale RN [33] as 57 per cent. This is in concurrence with our study.

Age

In our study the highest incidence is in 60-70 years of life.

The mean ages of presentation were 62.2 $\pm$13.8 years in males and 59.5 $\pm$12.8 years in females ($t = 0.969$, $d.f = 98$, $p > 0.05$) which was statistically not significant.

Bale RN [33] reports in his study that nearly 78% of cases were over the age of 30 years Amongst this the peak was at 51-60 years of age (26%).

Matthew W. et al[45] reported the mean age of presentation as 60.7 yrs.

Bharathi MJ et al[40] in his study found that patients with age greater than 30 years were significantly more in number in chronic dacryocystitis (90%) than those aged less than 31 years (10%).

Laterality

In our study in males, right eye was involved in 33.3%, left eye in 43.7% and both eyes in 54.8%. In females the incidence in right eye was 66.7%, left eye was 56.2% and both eyes was 64.5% The total incidence in right eye was 36%, incidence in left eye was 16% and involvement of both eyes was 48%.

The affection of side was found by Sood et al[44] as 50 each right and left. Veris[46] observed the occurrence to be on the left as 66%.

Bale RN[33] found that the incidence was 51.04% in left eye H.Basil Jacobs (1959)[47] in his study found that right side was involved in 53 cases left side in 37 cases and 14 cases were bilateral.

Dalgleish (1967)[48] stated that there was no significant difference in right eye and left eye affection and that the incidence of bilaterality increases with age.

Thus there is no predilection to any side and it may affect both sides equally.

Duration of symptoms

It was observed that 63% of patients presented to us within the first 10 months and 25% within the next 10 months of the onset of symptoms.

Duct patency

On syringing of the total 200 eyes, nasolacrimal duct was found to be patent in 53 eyes, regurgitation of clear fluid was seen in 37 eyes and regurgitation of pus was seen in 110 eyes. Thus the number of eyes with infection was 110.

Bacteriological profile

The most common gram positive organism cultured in our study was *Coagulase negative Staphylococcus* (29.1%) followed by *Staphylococcus aureus* (20%) and then *Streptococcus* (11.8%).

Similar incidence was reported by Bharathi MJ et al[40], in cases of chronic dacryocystitis, CoNS (563 of 1275; 44.2%) followed by *S.aureus* (138 of 1275; 10.8%) and *S. pneumoniae* (111 of 1275;8.7%) were found to be the predominant bacterial pathogens.

Das JK et al[49] report in their study the occurrence of gram positive organisms to be 75% which were predominantly *Staphylococcus species.* M.Chaudry et al[50] found in their study that *CoNS* constituted 33.96% and *Staphylococcus aureus* 25.46% of gram positive organisms.

Streptococcus species represented 20% in our study which is higher than Huber Spitzy et al[36] (2%), Coden et al[51] (2.3%) and Hartikainen et al[52] (5%).

In our study Gram negative organisms contributed to 16.4% of all isolates. The most frequently isolated species being *Pseudomonas aeruginosa* (7/18; 6.4%) followed by *Klebsiella* (6/18; 5.5%).

Similarly Das JK et al[48] found gram negative organisms to be 25% with a predominance of *Pseudomonas aeruginosa.*

Coden DJ et al[50] observed gram negative organisms in 27% of all isolates, including *Pseudomonas* in 9%.

Huber Spitzy et al[36] reported gram negative organisms accounting for 26% isolates, the most frequent being *E.coli* (12%)

Surgery

In our study out of 110 eyes, DCR was done in 18 eyes (16.4%) and DCT was done in 92 eyes (83.6%). DCR was done for younger patients (less than 40 years of age) and DCT was done for older patients. The association was statistically very highly significant ($P<0.001$).

Antibiotic Sensitivity

The analysis of invitro susceptibility showed, that among fluoroquinolones, Gatifloxacin (84.7%) and Moxifloxacin (76.5%) shows higher efficacy against all pathogens. Gram positive organisms were highly sensitive to Gatifloxacin (95.5%) , whereas Gram negative

organisms were highly sensitive to Cefazolin (94.4%) .The above sensitivities were statistically very highly significant ($p<0.001$). Neither gram positive nor gram negative organisms ($p>0.05$) had significant sensitivity to Amikacin and Gentamicin.

The analysis of invitro resistance showed that Gram positive organisms had high degree of resistance to Gentamicin (38.8%), Cefotaxime (37.3%) Ofloxacin (31.3%) and Tobramycin (26.9%). For gram negative organisms Vancomycin (77.8%), Moxifloxacin (61.1%) and Ciprofloxacin (61.1%) had highest resistance. Least resistance was seen with Cefazolin (5.6%).

CONCLUSION

In our study, incidence of chronic dacryocystitis was found more in females than males, the mean age of presentation was 60.5±13.2 years, most of the patients presented to us within 10 months of the onset of symptoms. DCT was done in 92 eyes and DCR was done 18 eyes. The most common micro organism isolated was *Coagulase negative Staphylococcus* followed *Staphylococcus aureus* & *Streptococcus* species. Gram positive organisms showed highest sensitivity to Gatifloxacin , Moxifloxacin and Gram negative organisms to Cefazolin . The high rate of micro-organism positive cultures suggests that adult patients should be treated for their lacrimal sac infection before any intraocular surgery because of the potential risk of post operative infection. Bacterial flora is abundant at the eyelid margin and the setting is conducive to a possible spontaneous mutation that can cause antibiotic resistance. Hence a prudent use of antibiotics is essential. Unnecessary usage of antibiotic leads to emergence of resistance. Thus in cases of regurgitation it is better to use Gatifloxacin or Moxifloxacin as they are more effective.

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PROFORMA

S.No M.R.No. Date

Name

Age/Sex

Occupation

H/o Presenting illness : Watering

Discharge

Pain

Swelling in sac area

Duration

H/o Past illness : Previous similar episodes

Side involved

Duration

Previous surgeries (DCT/DCR)

H/o ENT problems

H/o Systemic illness

Ocular examination

Lids Upper puncta

Lower puncta

Conjunctiva

Cornea

Anterior chamber

Iris

Pupil

Lens

Extraocular muscles

Investigation

Right eye left eye

ROPLAS

Syringing of duct

ENT Opinion

Clinical Diagnosis :

Culture report

Organism grown in culture:

Antibiotic more sensitive :

Treatment planned

Antibiotic given :

Surgical procedure done :

Follow up

S. no	Op/Ip cases	Age	Duration	Sex	Patency		Treatment		Organism Grown		Culture Sensitivity									
					RE	LE	RE	LE	RE	LE	G	M	C	V	O	CZ	A	T	G	CF
1	28752	33	5	M	-	RP	-	DCR	-	Pseudo	R	R	R	S	R	S	S	S	R	S
2	166628	51	6	F	RP	RC	DCT	-	NO	NO	-	-	-	-	-	-	-	-	-	-
3	191830	71	4	F	RP	RC	DCT	-	CoNS	NO	S	S	S	S	S	S	S	S	S	S
4	36380	53	3	F	RC	RC	-	-	-	NO	-	-	-	-	-	-	-	-	-	-
5	36827	62	4	M	-	RP	-	DCT	-	Hemo	R	R	R	R	S	S	R	S	S	S
6	36624	83	16	M	RP	-	DCT	-	NO	-	-	-	-	-	-	-	-	-	-	-
7	206076	54	8	F	RC	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	-
8	38935	61	6	F	RP	RC	DCT	_	CoNS	-	S	S	S	R	R	I	I	S	S	S
9	38928	63	7	F	RC	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	-
10	41903	34	8	F	RC	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	-
11	223080	65	13	M	RP	-	DCT	-	Staph	-	S	S	S	S	R	S	S	I	S	S
12	43765	55	6	F	RC	RP	-	DCT	NO	Staph	S	S	S	S	S	S	S	S	I	S
13	44723	61	5	F	-	RP	-	DCT	-	Hemo	R	R	R	R	S	S	R	S	S	S
14	44192	34	6	M	RP	RC	DCR	-	Staph	NO	S	S	S	R	I	S	S	R	R	I
15	45735	81	10	M	RP	RC	DCT	-	Kleb	NO	S	S	R	R	S	S	S	S	R	S
16	240481	66	9	M	RP	RC	DCT	-	CoNS	NO	S	S	S	S	S	S	S	S	R	R
17	247806	32	15	F	-	RP	-	DCT	-	ST	S	S	S	S	S	R	R	R	S	S
18	257418	74	8	M	-	RC	-	-	-	NO	-	-	-	-	-	-	-	-	-	-

19	260212	56	9	F	RP	-	DCT	-	CoNS	-	I	R	S	R	R	S	S	S	R	R
20	272344	52	6	F	RP	-	DCT	-	ST	-	S	S	S	S	S	I	R	I	I	S
21	272307	62	5	M	RP	-	DCT	-	Staph	-	S	S	S	R	R	S	I	S	S	S
22	204914	61	14	F	RP	-	DCT	-	NO	-	-	-	-	-	-	-	-	-	-	-
23	188910	31	9	F	-	RP	-	DCR	-	Pseudo	R	I	R	R	S	S	R	S	S	S
24	121510	61	6	M	RP	-	DCT	-	CoNS	-	S	S	I	I	R	S	S	S	S	S
25	21196	63	5	F	-	RP	-	DCT	-	ST	S	S	S	S	S	S	R	R	R	S
26	94768	63	8	F	RP	-	DCT	-	Kleb	-	S	S	S	R	S	S	S	S	R	S
27	14255	32	4	M	RP	RC	DCR	-	Staph	NO	R	I	S	S	S	S	S	R	R	R
28	36020	65	3	F	RC	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	-
29	30102	64	6	F	RP	RC	DCT	-	NO	NO	-	-	-	-	-	-	-	-	-	-
30	16980	83	8	M	RP	-	DCT	-	ST	-	S	S	S	S	S	R	R	S	R	S
31	12435	53	9	F	RP	-	DCT	-	Staph	-	S	S	I	S	S	R	I	S	S	S
32	15121	72	6	F	RP	-	DCT	-	CoNS	-	S	S	R	S	S	S	S	S	S	S
33	82661	35	14	F	RP	-	DCR	-	NO	-	-	-	-	-	-	-	-	-	-	-
34	12863	73	20	M	-	RP	-	DCT	-	Pseudo	R	R	R	R	S	S	S	S	I	S
35	61161	72	6	M	RP	RP	DCT	DCT	NO	NO	-	-	-	-	-	-	-	-	-	-
36	14021	64	8	F	RP	RC	DCT	-	CoNS	NO	S	S	S	S	S	S	S	S	S	S
37	24327	65	22	M	-	RP	-	DCT	-	Staph	S	S	S	R	I	R	R	S	R	R
38	21062	36	3	F	RP	RC	DCR	-	CoNS	NO	S	S	S	S	S	S	S	I	I	I
39	18442	64	13	M	RP	-	DCT	-	NO	-	-	-	-	-	-	-	-	-	-	-

40	18045	73	8	F	RP	-	DCT	-	ST	-	S	S	S	S	S	I	R	I	S	S
41	10420	68	6	F	RP	-	DCT	-	CoNS	-	S	S	S	R	I	S	S	R	R	R
42	11130	39	3	F	RP	RC	DCR	-	CoNS	NO	S	S	S	S	R	S	S	S	S	S
43	13028	61	16	M	RC	RC	-	-	-	NO	-	-	-	-	-	-	-	-	-	-
44	11047	67	8	F	RP	RC	DCT	-	Kleb	NO	S	S	S	S	S	S	R	R	S	S
45	12252	73	15	M	RP	RP	DCT	DCT	NO	Staph	S	I	I	S	R	I	R	S	R	R
46	14238	63	6	F	RP	-	DCT	-	CoNS	-	S	I	I	S	I	S	S	S	S	R
47	12220	64	8	F	RP	-	DCT	-	NO	-	-	-	-	-	-	-	-	-	-	-
48	13422	72	3	F	RP	-	DCT	-	CoNS	-	S	S	S	R	R	S	S	S	S	S
49	13542	61	13	M	RP	-	DCT	-	kleb	-	S	R	S	S	S	S	S	R	S	S
50	13719	32	14	F	RP	RC	DCR	-	NO	NO	-	-	-	-	-	-	-	-	-	-
51	20229	82	6	F	RP	-	DCT	-	CoNS	-	S	I	S	S	S	S	S	S	S	S
52	23409	63	5	M	RP	RP	DCT	DCT	CoNS	CoNS	S	S	S	S	S	S	S	I	I	R
53	23167	42	4	M	RP	-	DCR	-	Staph	-	S	S	S	S	R	S	S	S	R	R
54	28481	52	37	M	RP	RC	DCT	-	CoNS	NO	S	S	S	S	I	S	S	S	S	S
55	83812	53	22	F	-	RP	-	DCT	-	Staph	S	S	S	S	S	S	S	S	I	I
56	11388	62	8	M	RP	RC	DCT	-	NO	NO	-	-	-	-	-	-	-	-	-	-
57	11421	33	6	F	RP	RP	DCR	DCR	CoNS	CoNS	S	S	S	S	S	S	S	S	I	I
58	10142	66	18	M	RP	RC	DCT	-	Staph	NO	S	S	S	S	R	S	S	S	S	S
59	13424	71	3	F	RP	RC	DCT	-	Staph	NO	S	S	S	S	I	S	S	S	R	R
60	64221	63	38	M	RP	-	DCT	-	Pseudo	-	S	R	R	R	S	S	S	S	R	S

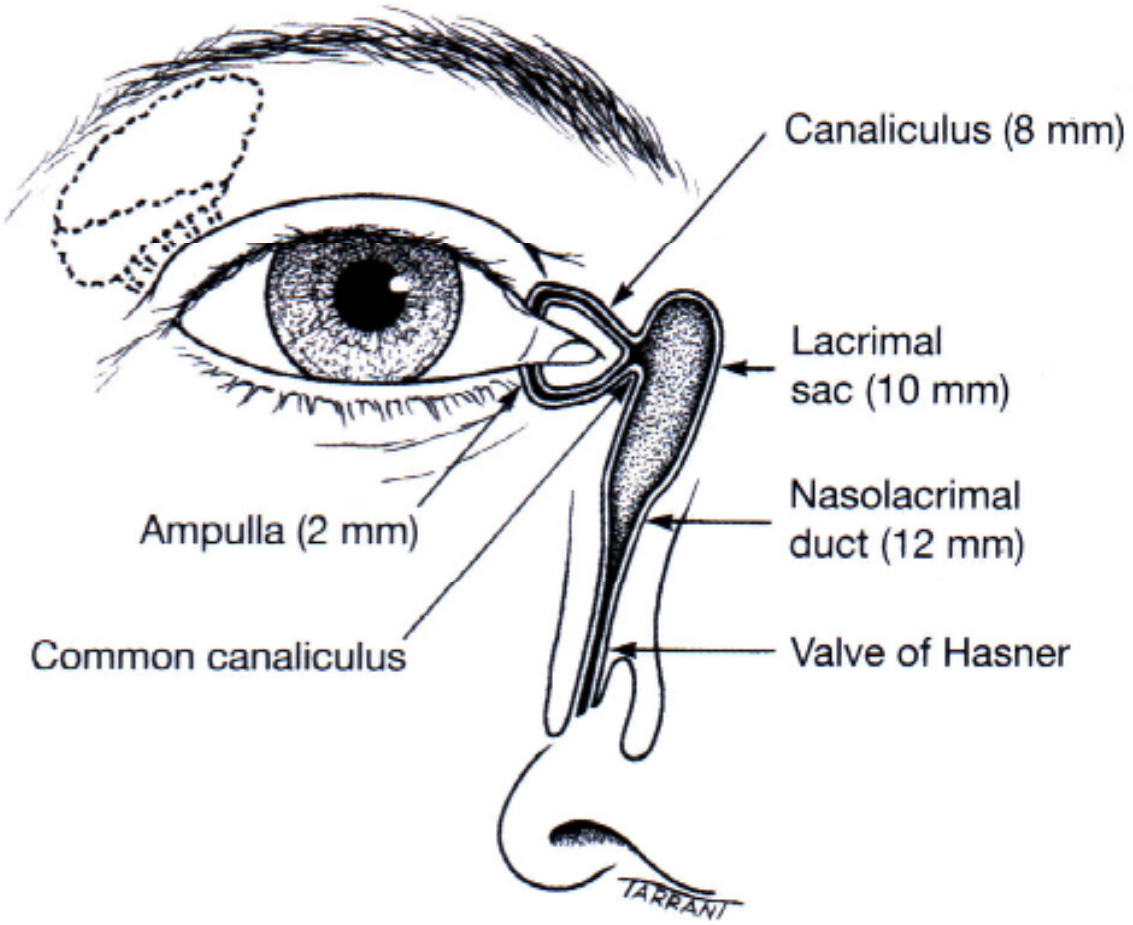
61	66336	54	15	F	RP	RP	DCT	DCT	ST	ST	S	S	S	S	R	S	S	S	R	R
62	24271	71	9	M	RC	RP	-	DCT	NO	CoNS	S	S	S	S	S	S	S	S	S	S
63	28831	51	13	F	-	RP	-	DCT	-	CoNS	S	S	S	R	I	I	I	I	I	R
64	23312	77	38	F	RP	RP	DCT	DCT	Staph	Staph	S	S	I	R	S	R	R	R	S	S
65	22441	82	8	F	RP	RC	DCT	-	Pseudo	NO	R	R	S	R	S	S	R	S	I	R
66	20112	62	10	M	-	RP	-	DCT	-	ST	S	S	S	S	S	S	I	R	R	S
67	28382	43	9	F	RP	-	DCR	-	Staph	-	S	S	S	S	R	S	S	S	R	R
68	14402	81	8	F	RP	-	DCT	-	CoNS	-	S	S	I	R	R	R	R	S	S	S
69	13312	61	4	F	RP	-	DCT	-	CoNS	-	S	S	S	S	S	S	S	R	R	R
70	12880	73	16	M	RP	-	DCT	-	NO	-	-	-	-	-	-	-	-	-	-	-
71	42551	64	15	F	RP	RC	DCT	-	NO	-	-	-	-	-	-	-	-	-	-	-
72	42861	65	14	F	RP	RP	DCT	DCT	NO	Staph	S	S	S	S	R	S	S	S	S	S
73	42632	66	6	F	RP	RC	DCT	-	Staph	NO	S	S	S	S	S	S	S	S	S	S
74	21118	74	42	F	-	RP	-	DCR	CoNS	E.Coli	S	S	S	R	R	R	S	S	S	R
75	28743	64	8	M	RP	RP	DCT	DCT	CoNS	NO	S	I	I	S	I	S	S	S	S	S
76	28431	67	13	F	RP	RP	DCT	DCT	ST	ST	S	S	R	R	I	S	S	S	R	R
77	24021	35	15	M	RP	RC	DCR	-	Staph	NO	S	S	S	R	R	S	S	S	S	S
78	14422	61	8	F	RC	RP	-	DCT	-	CoNS	S	S	S	S	S	S	S	R	I	I
79	14851	63	46	M	RP	RP	DCT	DCT	NO	NO	-	-	-	-	-	-	-	-	-	-
80	15631	74	8	F	-	RP	-	DCT	-	Kleb	S	S	S	R	S	S	S	S	S	S
81	15821	61	5	F	RP	RP	DCT	DCT	NO	CoNS	S	S	S	S	S	S	S	R	R	R

82	15421	62	13	F	RP	-	DCT	-	Staph	-	S	S	S	S	S	S	S	R	R	R
83	14300	63	6	F	RP	-	DCT	-	Staph	-	S	S	S	S	R	S	S	I	R	I
84	12288	54	5	M	RP	-	DCT	-	E.Coli	-	S	R	R	R	S	S	S	I	R	S
85	12431	45	24	F	RP	RP	DCR	DCR	NO	ST	R	I	R	S	S	S	R	R	R	S
86	12348	53	3	F	RP	RP	DCT	DCT	NO	CoNS	S	S	S	S	R	R	R	S	S	S
87	40068	52	15	F	-	RP	-	DCT	-	CoNS	S	S	S	S	I	I	I	R	R	R
88	13246	72	8	M	RP	RP	DCT	DCT	Staph	NO	S	S	S	S	S	S	S	S	S	S
89	14020	72	42	F	RP	RC	DCR	-	ST	NO	S	S	S	R	S	S	R	R	R	S
90	14408	61	16	F	RP	RP	DCT	DCT	CoNS	NO	S	S	S	R	R	I	R	S	S	S
91	13202	52	9	F	RP	-	DCT	-	Pseudo	-	R	R	R	R	S	S	R	S	R	R
92	12082	82	4	M	-	RP	-	DCT	-	CoNS	S	S	S	I	R	S	S	S	S	S
93	11012	75	18	F	RP	RP	DCT	DCT	CoNS	CoNS	S	S	S	S	S	S	S	R	I	R
94	10038	65	6	F	RP	RP	DCT	DCT	Staph	NO	S	R	S	I	S	S	S	I	R	R
95	67321	64	22	F	RP	-	DCT	-	Kleb	-	R	S	S	S	S	S	R	S	S	S
96	43210	67	7	M	RP	-	DCT	-	CoNS	-	S	S	S	S	R	S	S	S	R	R
97	62328	72	4	F	RP	-	DCT	-	ST	-	S	S	S	S	S	R	R	R	S	S
98	20322	61	13	F	RP	RC	DCT	-	Pseudo	NO	R	R	R	R	S	S	S	S	R	R
99	13579	43	8	M	RC	RP	-	DCR	NO	Hemo	R	R	R	R	S	S	R	S	S	S
100	54321	65	24	F	RP	RC	DCT	-	NO	NO	-	-	-	-	-	-	-	-	-	-

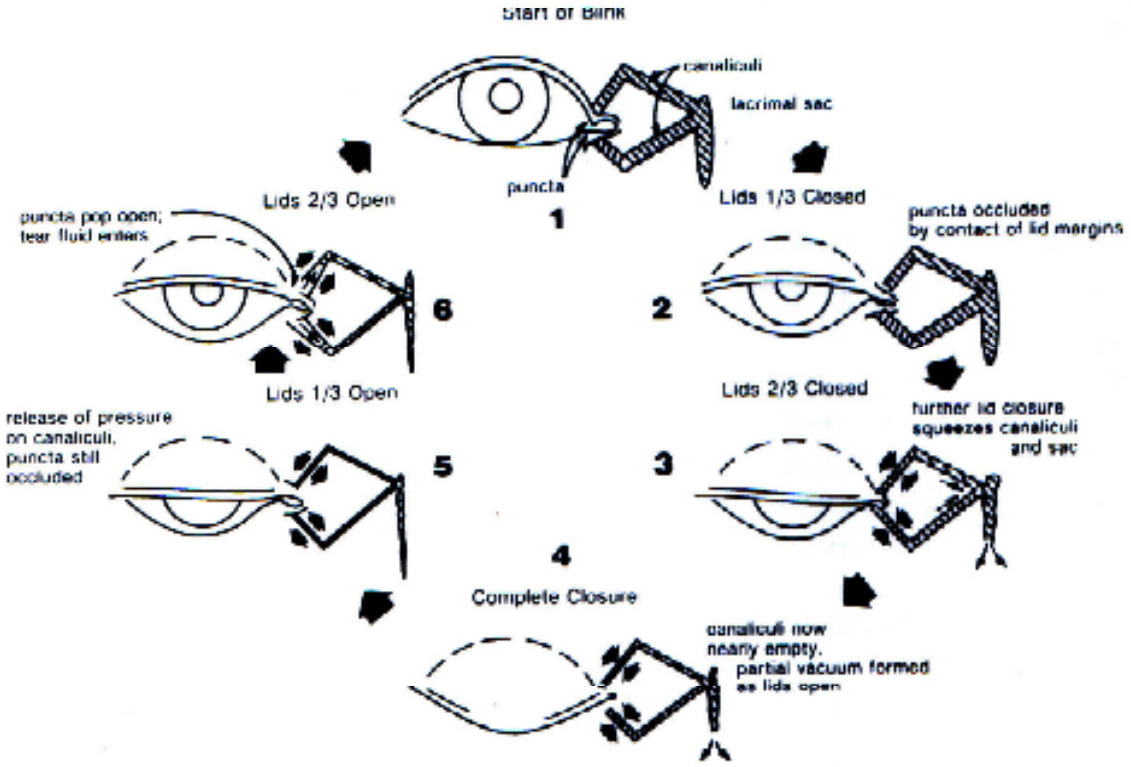
KEY TO MASTER CHART

RC	-	Regurgitation of clear fluid
RP	-	Regurgitation of pus
DCT	-	Dacryocystectomy
DCR	-	Dacryocystorhinostomy
CoNS	-	Coagulase Negative Staphylococcus aureus
Staph	-	Staphylococcus aureus
ST	-	Streptococcus species
Kleb	-	Klebsiella
Pseudo	-	Pseudomonas
Hemo	-	Hemophilus
E.Coli	-	Escherichia coli
G	-	Gatifloxacin
M	-	Moxifloxacin
C	-	Ciprofloxacin
V	-	Vancomycin
O	-	Ofloxacin
CZ	-	Cefazolin
A	-	Amikacin
T	-	Tobramycin
GM	-	Gentamicin
CF	-	Cefotaxime
S	-	Sensitive
R	-	Resistant
I	-	Intermediate

Anatomy of Lacrimal Apparatus

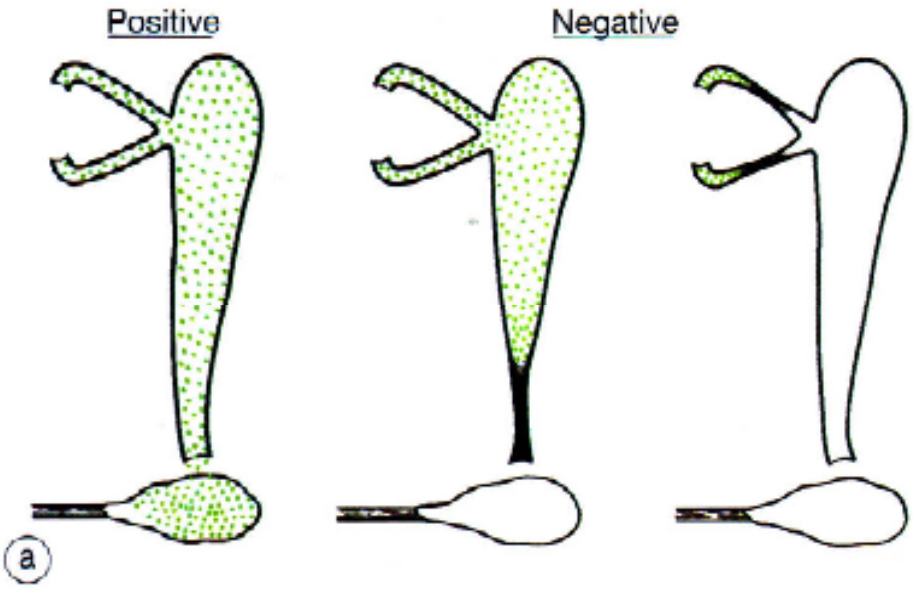


Tear Pump

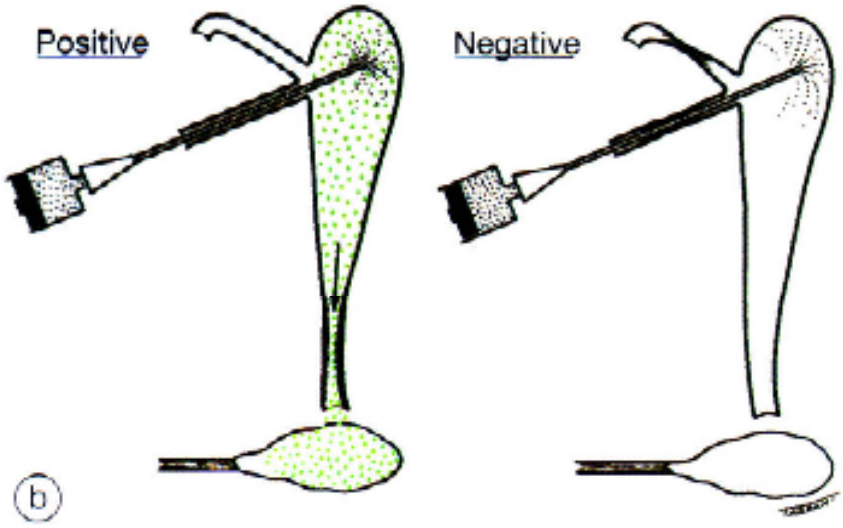


Mechanism of lacrimal drainage (Rosengren-Doane). Clockwise from top: *1,* At the start of the blink, the lacrimal drainage passages already contain tear fluid that has entered following the previous blink. *2,* As upper eyelid descends, the papillae containing the punctal openings elevate from the medial lid margin. By the time the upper eyelid has descended halfway, the papillae forcefully meet the opposing lid margin, effectively occluding the puncta and preventing fluid regurgitation. *3,* The remaining portion of lid closure acts to squeeze the canaliculi and sac through the action of the orbicularis oculi, forcing out the contained fluid via the nasolacrimal duct. *4,* At complete eyelid closure, the system is compressed and largely empty of fluid. *5,* At the beginning of the opening phase of a blink, the puncta are still occluded, and valving action at the inner end of canaliculi (and perhaps in the nasolacrimal duct) acts to prevent reentry of fluid or air. Compressive action ends and elastic walls of passages try to expand to their normal shape. This elastic force causes a partial vacuum or suction to form within the canaliculi and sac. *6,* Suction force holding punctal region of eyelid margin together is released when eyelid separation is sufficient. The punctal papillae suddenly pop apart at this point, opening the canaliculi for fluid entry, which occurs during the first few seconds after the blink. *(Modified from Doane MG. Blinking and the mechanics of the lacrimal drainage system. Ophthalmology. 1981;88:850.)*

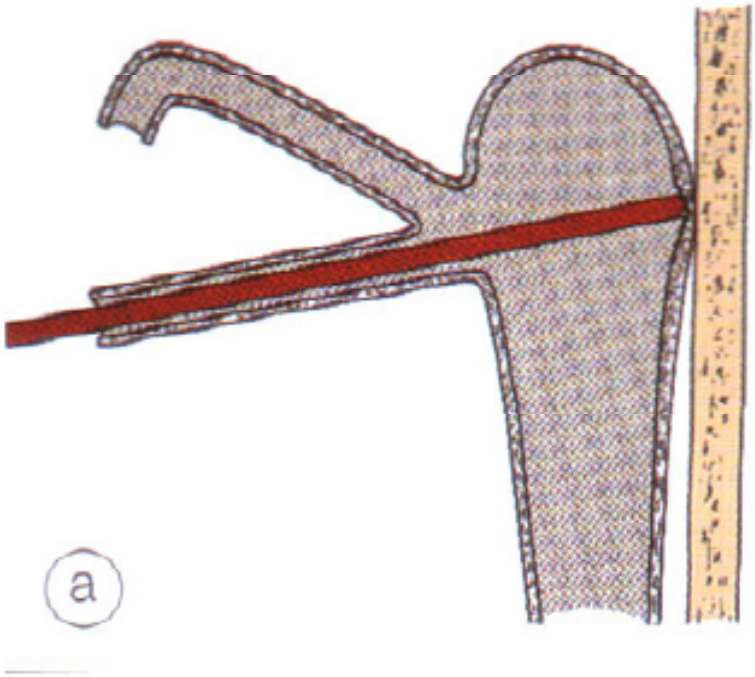
Jones I Test



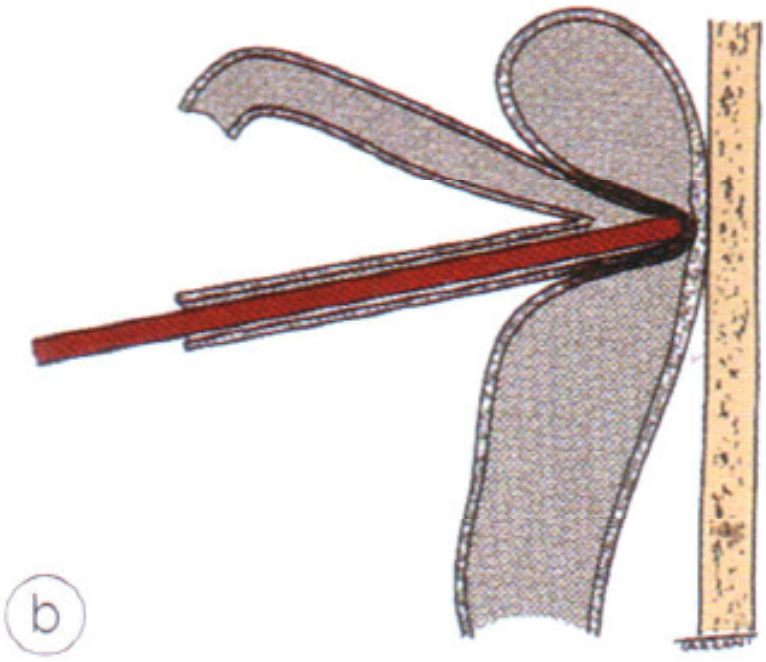
Jones II Test



Hard Stop

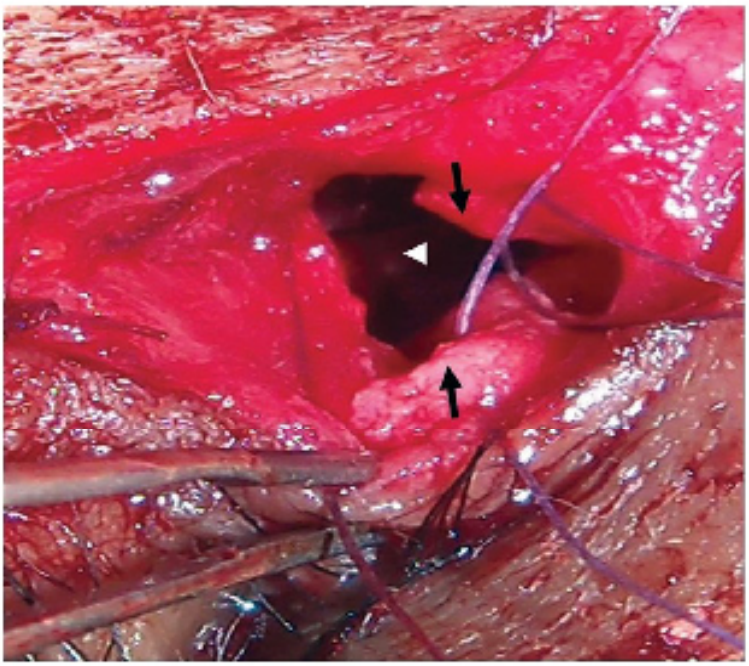


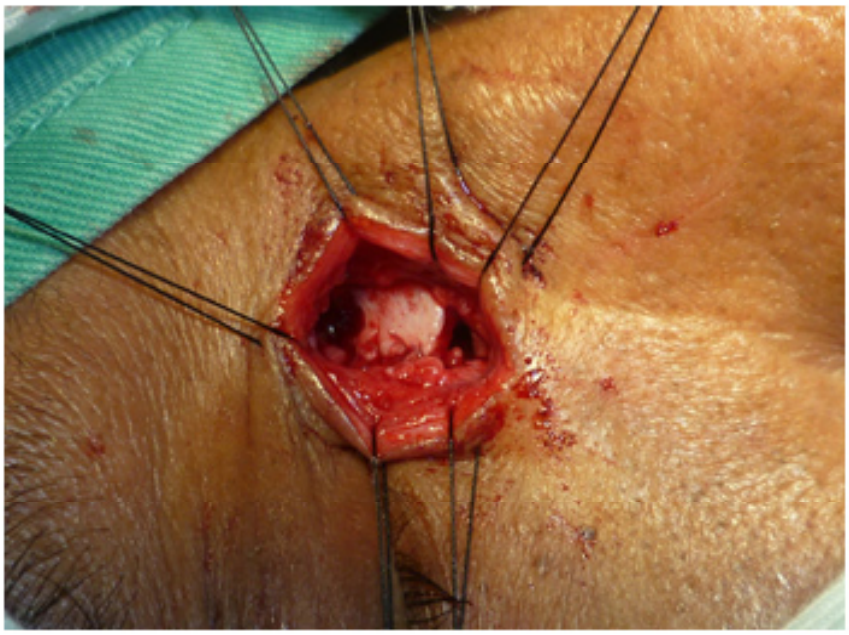
Soft Stop



Regurgitation of Pus on syringing

Dacryocystorhinostomy





Dacryocystectomy specimen

Culture Sensitivity
Staphylococcus aureus